ADAMS BROADWELL JOSEPH & CARDOZO
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
601 GATEWAY BOULEVARD, SUITE 1000
SOUTH SAN FRANCISCO, CA 94080-7037

TEL: (650) 589-1660
FAX: (650) 589-5062
eklebaner@adamsbroadwell.com

DANIEL L. CARDOZO
THOMAS A. ENSLOW
TANYA A. GULESSERIAN
JASON W. HOLDER
MARC D. JOSEPH
ELIZABETH KLEBANER
RACHAEL E. KOSS
LOULENA A. MILES
ROBYN C. PURCHIA

OF COUNSEL
THOMAS R. ADAMS
ANN BROADWELL
GLORIA D. SMITH

SACRAMENTO OFFICE
520 CAPITOL MALL, SUITE 350
SACRAMENTO, CA 95814-4715
TEL: (916) 444-6201
FAX: (916) 444-6209

June 15, 2010

DOCKET
09-AFC-6
DATE JUN 15 2010
RECD. JUN 16 2010

VIA OVERNIGHT MAIL

California Energy Commission
Attn: Docket No. 09AFC6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

Re: 09-AFC-6 Blythe Solar Power Plant Project

Dear Docket Clerk:

Enclosed are (1) a hard copy of the CURE's exhibits, (2) a CD containing the exhibits, and (3) a copy of this letter. Please process the enclosed and provide us with a conformed copy of this letter in the envelope provided.

Thank you.

Sincerely,

Elizabeth Klebaner

EK:bh
Enclosures

2398-068a

printed on recycled paper

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

CALIFORNIA UNIONS FOR RELIABLE ENERGY TENTATIVE SEQUENTIAL EXHIBIT LIST FOR THE BLYTHE SOLAR POWER PROJECT

June 15, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

2398-073a

Exhibit	Witness	Brief Description
		BIOLOGY
300	Bleich	Opening Testimony of Vernon C. Bleich
301	Bleich	Bleich C.V.
301-A	Bleich	Rebuttal Testimony of Vernon C. Bleich
302	Cashen	Opening Testimony of Scott Cashen
303	Cashen	Cashen C.V.
304	Cashen	Documented Occurrences of Gila Woodpeckers from California Natural Diversity Database. 2009. Rarefind [computer program]. Version 3.1.0. Mar. 2, 2010, Sacramento CLA): Wildlife Habitat Data Analysis Branch. California Department of Fish and Game
305	Cashen	Current (2009) Range of Gila Woodpecker in California from Cal PIF (California partners in Flight). 2009. Version 1.0. the Desert Bird Conservation Plan: A strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California. Partners in Flight.
306	Cashen	Memo to Craig Hoffman from Heather Blair (2/5/10) Re Abengoa Mojave Solar Project – time sensitive issues and informational needs
306-A	Cashen	Rebuttal Testimony of Scott Cashen
307	Toure	Opening Testimony of T'Shaka Toure
308	Toure	Toure C.V.
308-A	Toure	Rebuttal Testimony of T'Shaka Toure
309		U.S. EPA, Reducing Stormwater Costs Through Low Impact Development (LID) Strategies and Practices
310		Correspondence among Lin Porter, A. Solomon and Solar Millenium (3/10/09, 5/21/09, 2/19/10, 2/22/10)
311		Comments on the Draft Desert Tortoise Relocation/Translocation Plan for the Palen and Blythe Solar Energy Projects (submitted by Carlsbad Fish and Wildlife 4/15/10)
312		Summary of Biological Resource Survey Studies and Methodologies Planned or Currently Being Implemented for 2010 (submitted by Solar Millennium LLC, 4/22/10)
313		Draft Summary: Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants, and Jurisdictional Waters (submitted by Solar Millennium LLC 5/10/10)
314		Solar Millennium, LLC response to questions generated at the April 28, 29, and May 7, 2010 CEC Workshops for the Blythe Solar Power Project (5/14/10)
315		Solar Millennium Blythe Power Plant Project California Energy Commission Docket 09-AFC-5, Docket Log (as of

		5/27/10)
316		Notification of Revision Memorandum (submitted by Solar Millennium LLC, 5/28/10)
317		Palo Verde Solar I Biological Resources Spring Survey Protocols (6/11/10)
		CULTURAL
318	Laurain	Janet Laurain Declaration
319		BLM Response to FOIA Request (4/12/10)
320		John Kalish, US Dept of the Interior, letter to Apple and Doolittle, AECOM (8/5/09), authorizing cultural resources fieldwork under Cultural Resource Use Permit CA-09-22 and Fieldwork Authorization No. 66.24-09-18
321		United Nations Declaration on the Rights of Indigenous Peoples
		LAND USE
322		Riverside County Airport Land Use Compatibility Plan, Chapter 1, Introduction, and Chapter 2, Countywide Policies (10/14/04)
323		Federal Aviation Administration, US Department of Transportation, Advisory Circular No. 150/5200-33A, Hazardous Wildlife Attractants on or Near Airports (7/27/04)
		WATER
324		Steven C. Hvinden, U.S. Dept. of the Interior, memo to Holly Roberts, Bureau of Land Management re Federal Register Notice Dated November 23, 2009, Entitled Notice of Intent to Prepare Two Environmental Impact Statements/Staff Assessments for the Proposed Chevron Energy Solutions/Solar Millennium Palen and Blythe Solar Power Plants, Riverside County, CA and Possible Land Use Plan Amendments, (12/21/09).
325	Laurain	Janet Laurain Declaration
326		Colorado River Board of California response to CURE's PRA request (2/22/10)
327		Agenda, Solar Millennium, LLC/Chevron Energy Solutions Blythe and Palen Projects Meeting with the Colorado River Board of California (11/23/09)
328		Agenda, Solar Millennium LLC/Chevron Energy Solutions Blythe and Palen Solar Power Projects Teleconference Meeting with the Colorado River Board of California Agenda, (1/6/10)
329		Solar Millennium LLC Blythe & Palen Solar Power Projects presentation to Colorado River Board of California (1/6/10)

330		U.S. Geological Survey, Water. Resources Investigations Report, 94-4005 River, river aquifer and accounting surfaces, Blythe – Plate 15
331		Colorado River Accounting Surface Map "Explanation" (map)
332		Gerald R. Zimmerman, Colorado River Board letter to Alan H. Solomon, CEC, (3/22/10) requiring a Section 5 BCPA contractual entitlement
		WASTE MANAGEMENT
333	Hagemann	Opening Testimony of Matt Hagemann
334	Hagemann	Hagemann C.V.
335	Laurain	Janet Laurain Declaration
336		Email to Janet M. Laurain from Anna Ayala (U.S. Army Corps of Engineers) re FOIA request (5/20/10)
337		Defense Environmental Restoration Program Formerly Used Defense Sites Findings and Determination of Eligibility Site No. J09CA024500 (18 pages)
338	Hagemann	Boundary Sketch Blythe Army Airfield
339	Hagemann	Installation Map Blythe Army Airfield FUDS Project No. J09CA024502
340	Hagemann	Poor Man, Blythe Army Airfield, CA FUDS Project No. J09CA024502 CTT (map)
341	Hagemann	Jeep Range Blythe Army Airfield, CA FUDS Project No. J09CA024502 CTT (map)
342	Hagemann	Defense Environmental Restoration Program for the Formerly Used Defense Sites Findings Ordnance and Explosives Archives Search Report for the former Nellis Small Arms Range, Las Vegas, NV, Project Number J09NV051001
343	Laurain	Janet Laurain Declaration
344		Department of Fish and Game letter to Janet Laurain responding to CURE's Public Records Act request (4/8/10)
345		Email from Shelly Dayman to Tannika Engelhard re Solar Millennium – Desert Tortoise Surveys, Blythe Site (5/26/09)
346	Hagemann	Project Location Map, FUDS and Ranges
347	Hagemann	Reduced Acreage Alternative Map, FUDS and Ranges
348	Hagemann	Reconfigured Alternative Map, FUDS and Ranges
349		Military Munitions and Explosives of Concern: A Handbook for Federal Land Managers, with Emphasis on Unexploded Ordnance (BLM Handbook 2/06)

EXHIBIT 300

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

TESTIMONY OF VERNON C. BLEICH ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 11, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

2398-045a

I. Introduction

I have reviewed those documents that address evidence of mule deer and bighorn sheep on or near the property proposed for the development of the project known as the Blythe Solar Power Project ("Project") in eastern Riverside County. It is my opinion that the aforementioned documents have inadequately portrayed the potential importance of the location to two species of large mammals, bighorn sheep and mule deer, that occur in the area. Further, they have not addressed the impacts of the Project in the context of a potential effort to reestablish pronghorn in a geographic area that evidence indicates formerly was occupied by that species. My *curriculum vitae* is attached as Attachment 1.

My critique centers on three primary areas of concern. (1) The absence of more recent information that enhances the probability of bighorn sheep occupying the McCoy Mountains and the Project site; (2) the importance of wash habitat as a seasonal foraging area that provides high-quality nutrients during certain periods of the year; and (3) impacts to movement corridors that might be used by bighorn sheep traveling to or from the McCoy Mountains. It is my opinion that the Project has similar negative implications for mule deer inhabiting eastern Riverside County, and dismissal of impacts to that species as insignificant is not appropriate.

II. The potential for bighorn sheep to occur in the McCoy Mountains and to use the Project site

The SA acknowledges the potential for bighorn sheep to be impacted by the Project, and recommends that Applicant develop a single water source in the McCoy Mountains.[1] Staff stipulated that the Applicant shall provide mitigation in the form of a wildlife water development at an, as yet, undetermined location in the McCoy Mountains.[2]

The argument that mitigation is not necessary would be based on the uncertainty associated with distinguishing between the tracks of bighorn sheep and mule deer and, in part, on the uncertainty associated with distinguishing between the scat of those species.[3] Such argument would appear to have a basis in the Applicant's statement that, "[t]he status of bighorn sheep in the Project area is not well understood."[4] The initial part of my testimony relates to better understanding of the distribution and presence of bighorn sheep in the vicinity of the Project area given the recent availability of information not included in the Revised Staff Assessment or provided by the Applicant.

The Applicant noted "... a paper published in the 2007 issue of the Transactions of the Desert Bighorn Council..."[5] and cited it as evidence that desert ranges in the vicinity of Blythe may no longer be occupied by bighorn sheep; the citation for that paper

---

[1] Staff Assessment/Environmental Impact Statement, p. C.2-145.
[2] Staff Assessment/Environmental Impact Statement, p. C.2-145.
[3] *See* Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, pp. BIO-47 - BIO-48.
[4] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.
[5] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

is not provided, but it is my assumption that the paper in question is that of Bleich and Weaver (2007).[6] Not all of the information provided by Bleich and Weaver (2007) was fully conveyed in the Applicant's response to CEC Staff Data Request DR-BIO-54.[7] Bleich and Weaver (1977) cited Weaver (1957)[8] for documentation that during the 1950s the mountain ranges in the vicinity of Blythe [the majority of which surround the Project site][9] were reported to "have some sheep in them some of the time." Weaver (1957) did note, however, that those mountain ranges *may* not have had sheep in them at the time he wrote his paper.

Weaver and Mensch (1971)[10] concluded that bighorn sheep did not occupy the Little Maria or McCoy mountains at the time of their survey, but described occupancy of the Big Maria Mountains by bighorn sheep as being "transient." *Based on that information and a lack of data to the contrary*, Epps et al. (2003)[11] assumed that bighorn sheep had been extirpated from the Big Maria, Little Maria, Riverside, and McCoy mountains, and the Applicant concluded that, "[a]s of 2003, no new data exists [*sic*] about the status of bighorn sheep in the McCoy, Little and Big Maria Mountains and the bighorn sheep populations in these ranges are considered extirpated..."[12] New information, however, has become available, and must be considered in the context of potential impacts to bighorn sheep resulting from development of this Project.

During 2009, it became apparent that bighorn sheep were present in the Little Maria Mountains, located north of the Project site, and there is evidence of their presence over an extended period of time.[13,14] The presence of bighorn sheep in the Little Maria Mountains has also been confirmed by another highly qualified investigator, who also noted evidence of lambs in that range and, further, used DNA derived from fresh fecal material (scat) to confirm occupancy of that range by bighorn sheep.[15] Evidence that reproduction is occurring in the Little Maria Mountains is very significant, because

---

[6] Bleich, V. C., and R. A. Weaver. 2007. Status of mountain sheep in California: comparisons between 1957 and 2007. Desert Bighorn Council Transactions 49:55-67.

[7] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[8] Weaver, R. A. 1957. Status of the bighorn sheep in California. Desert Bighorn Council Transactions 1:8-11.

[9] Among these ranges are the Big Maria, Little Maria, Riverside, and McCoy mountains north of Interstate Highway 10, and the Chuckwalla, Little Chuckwalla, and Mule mountains south of Interstate Highway 10.

[10] Weaver, R. A., and J. L. Mensch. 1971. Bighorn sheep in northeastern Riverside County. Wildlife Management Administrative Report 71-1. Wildlife Management Branch, California Department of Fish and Game, Sacramento, USA.

[11] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.

[12] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[13] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[14] Mr. Sudmeier, although a layman, has extensive knowledge of bighorn sheep, habitat characteristics, and evidence of their presence based on more than 45 years of experience working with those animals in the deserts of southeastern California.

[15] J. D. Wehausen, University of California White Mountain Research Station, personal communication on 2 June 2010.

female bighorn sheep are extremely conservative in their behavior[16] and colonization events among desert sheep are rarely detected and not often recorded;[17] further, colonization events may occur more frequently than previously recognized.[18] Staff acknowledged some of the aforementioned new information in the Revised Staff Assessment[19] but, for reasons unknown, failed to emphasize the presence of lambs in the Little Maria Mountains despite previously citing a memo[20] that provided that information.[21] In the SA/DEIS, Staff noted only that, "[r]ecent surveys also suggest bighorn sheep *may* [emphasis added] occur in the Little Maria Mountains (Wehausen 2009)."[22] Unfortunately, the Revised Staff Assessment does not mention the presence of lambs in the Little Maria Mountains; this remains an important oversight because, as previously noted, bighorn sheep were considered to have been extirpated from that range, and it raises the spectre of bighorn sheep occupancy of the McCoy Mountains, and Staff's conclusion that they do not exist in the McCoy Mountains is open to question.

Staff also acknowledges the presence of bighorn sheep in the Granite and Palen mountains, located west and northwest of the McCoy Mountains, respectively, and notes that the McCoy Mountains are within a bighorn sheep Wildlife Habitat Management Area that was identified in the Bureau of Land Management's Northern and Eastern Colorado Desert Plan.

The Applicant notes that the Project area was searched for evidence of bighorn sheep, but concluded that evidence obtained in the form of scat more likely was deposited by mule deer than by bighorn sheep. In the absence of supporting information, Staff concluded that it was unlikely that bighorn sheep currently use the Project site and McCoy Mountains.[23] I contend that, in the absence of definitive information to the contrary, it was inappropriate for Staff to conclude that bighorn sheep do not occupy the McCoy Mountains and, at least upon occasion, the adjacent Project area; it is always better to err on the conservative side of such issues. Rigorous application of the precautionary principle is warranted in this situation: in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is *not* harmful falls on those taking the action.[24]

---

[16] Geist, V. 1970. Mountain sheep. A study in ecology and evolution. University of Chicago Press, Chicago, Illinois.

[17] Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel. 1996. Metapopulation theory and mountain sheep: implications for conservation. Pp. 353-373 in D. R. McCullough (editor). Metapopulations and wildlife conservation. Island Press, Covelo, California.

[18] Epps, C. W., J. D. Wehausen, P. J. Palsbøll, and D. R. McCullough. 2005. Using genetic methods to describe and infer recent colonizations by desert bighorn sheep. Pp. 51-62 in Goerrissen, J., and J. M. Andre, editors. Symposium Proceedings for the Sweeney Granite Mountains Desert Research Center 1978-2003: A quarter century of research and teaching. University of California, Riverside.

[19] Revised Staff Assessment, p. C-2-38.

[20] SA/DEIS, p. C-2-36.

[21] Unpublished memo from J. D. Wehausen to various files entitled, "Investigation of Little Maria Mountains relative to bighorn sheep occupancy" and dated 11 December 2009.

[22] Staff EA/DEIS, p. C-2-36.

[23] Staff EA/DEIS, p. C-2-36.

[24] http://en.wikipedia.org/wiki/Precautionary_principle.

My purpose is not to denigrate those that contributed to the Revised Staff Assessment but, rather, to raise as an issue the probability of bighorn sheep inhabiting the McCoy Mountains instead of simply dismissing their presence as unlikely. Indeed, there is evidence to suggest that bighorn sheep have a much greater probability of occurring in the McCoy Mountains than is acknowledged in the Revised Staff Assessment.

For example, bighorn sheep were listed by Epps et al. (2003)[25] as extirpated not only from the McCoy Mountains, but also from the Big Maria, Little Maria, and Riverside Mountains, which largely surround the McCoy Mountains. As described earlier, the presence of bighorn sheep in the Little Maria Mountains has since been confirmed.[26, 27] Additionally, bighorn sheep were observed in the McCoy Mountains within the last 10 to 15 years.[28] Moreover, a bighorn sheep was killed by a motorist midway between the Riverside and Big Maria Mountains in November 2009, and its carcass was examined by personnel from the California Department of Fish and Game.[29] Further, the Iron Mountains, located northwest of the Little Maria Mountains and the McCoy Mountains, have been colonized recently by bighorn sheep.[30] These events suggest that there is greater potential for bighorn sheep to recolonize the mountains around Blythe than that assumed by the Applicant.[31]

The results of recent aerial surveys also are consistent with the potential for bighorn sheep to have recolonized the McCoy Mountains. Those surveys confirmed the presence of bighorn sheep of both sexes, as well as young, in the Chuckwalla Mountains and Little Chuckwalla Mountains (located south of Interstate Highway 10), in the Granite and Palen Mountains, and in the Coxcomb Mountains.[32] All of those areas, and even occupied areas further removed from the McCoy Mountains, could be sources of dispersing bighorn sheep given the vagility of those ungulates and their ability to move across areas not normally recognized as being bighorn sheep habitat (i.e., intermountain areas with little topographic relief).[33, 34, 35]

---

[25] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.

[26] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[27] Unpublished memo from J. D. Wehausen to various files entitled, Investigation of Little Maria Mountains relative to bighorn sheep occupancy and dated 11 December 2009.

[28] Lt. Richard Colby, of the California Department of Fish and Game (and now deceased) observed two young male bighorn sheep on the east side of the McCoy Mountains approximately 500 yards north of Interstate Highway 10 (G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010).

[29] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[30] Epps, C. W., J. D. Wehausen, P. J. Palsbøll, and D. R. McCullough. 2005. Using genetic methods to describe and infer recent colonizations by desert bighorn sheep. Pp. 51-62 in Goerrissen, J., and J. M. Andre, editors. Symposium Proceedings for the Sweeney Granite Mountains Desert Research Center 1978-2003: A quarter century of research and teaching. University of California, Riverside.

[31] *See* Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[32] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[33] Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1990. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology 4:383-390.

Observations of bighorn sheep were recorded opportunistically during recent flights to determine the presence of Golden Eagle aeries in the vicinity of the proposed project.[36] In my extensive experience, and in that of the majority of professional wildlife biologists with whom I have worked for more than three decades, bighorn sheep and other large mammals are difficult to see from the air, even by skilled and experienced observers conducting surveys focused exclusively on large ungulates. Indeed, research on this topic has demonstrated that many factors affect visibility, and that a large proportion of animals available to be seen during any given survey generally is missed.[37] In my opinion, it is probable that far more sheep occupy those mountain ranges than were actually observed. Moreover, the probability of bighorn sheep occurring in the McCoy Mountains is enhanced by the aforementioned observation of young males in that range, the fact that a bighorn sheep was killed midway between the Big Maria and Riverside Mountains less than 6 months ago,[38, 39] the heretofore unrecognized presence of bighorn sheep in the Little Maria Mountains,[40, 41, 42, 43] and the presence of bighorn sheep, including males, females, and young, in other mountain ranges in the vicinity of the McCoy Mountains.[44]

The observations reported above, including those of bighorn sheep in nearby mountain ranges, counter the Applicant's assertion that the probability that bighorn sheep occupy the McCoy Mountains, at least on a seasonal basis, is low. Indeed, bighorn sheep likely move between or among those mountain ranges while attempting to meet their nutritional needs and other life history requirements.[45, 46] Such movements would be consistent with a strategy that allows bighorn sheep to take advantage of nutrient availability, meet water demands, and provide for protection of offspring, depending on

---

[34] Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel. 1996. Metapopulation theory and mountain sheep: implications for conservation. Pp. 353-373 in D. R. McCullough (editor). Metapopulations and wildlife conservation. Island Press, Covelo, California.

[35] Epps, C. W., J. D. Wehausen, V. C. Bleich, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.

[36] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[37] See Bleich, V. C., C. S. Y. Chun, R. W. Anthes, T. E. Evans, and J. K. Fischer. 2001. Visibility bias and development of a sightability model for tule elk. Alces 37:315-327, and references therein.

[38] Lt. Richard Colby, of the California Department of Fish and Game (and now deceased) observed two young male bighorn sheep on the east side of the McCoy Mountains approximately 500 yards north of Interstate Highway 10 (G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010).

[39] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[40] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[41] J. D. Wehausen, University of California White Mountain Research Station, personal communication on 2 June 2010.

[42] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[43] Unpublished memo from J. D. Wehausen to various files entitled, Investigation of Little Maria Mountains relative to bighorn sheep occupancy and dated 11 December 2009.

[44] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[45] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[46] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

the seasonal availability or need for those resources. Similar strategies have been demonstrated among bighorn sheep elsewhere in California, where bighorn sheep move long distances in response to changing environmental conditions.[47, 48] The ability of bighorn sheep to move between and among mountain ranges is well established, and increasing evidence suggests that bighorn sheep are capable of moving long distances, and that they do move long distances, across seemingly unsuitable areas between the stereotypical habitats (i.e., steep and rugged terrain) with which they normally are associated.[49, 50, 51, 52] Thus, it is unclear why Staff would cite discussions with L. LaPre[53] to substantiate their conclusion that the Project site, due to the width of the valley in which the solar facility would be located, has limited value as a movement corridor.

The area in the vicinity of the Project site is very arid, and total rainfall is low and very seasonal.[54, 55] Additionally, surface water is very limited,[56] and its importance to bighorn sheep varies seasonally.[57] The assertion that no permanent water source exists near the Project site[58] is irrelevant, as bighorn sheep are dependent upon surface water during the hottest periods of the year but can meet water demands through forage intake during cooler periods.[59] Further, the nutritional value of forage also varies seasonally, and is affected demonstrably by rainfall.[60] Thus, use of the Project area by bighorn sheep

---

[47] Jaeger, J. R. 1994. Demography and movements of mountain sheep in the Kingston and Clark mountain ranges, California. M.S. thesis, University of Nevada, Las Vegas.

[48] Thompson, D. B., K. Longshore, and C.Lowery. 2007. The impact of human disturbance on desert bighorn sheep (Ovis canadensis nelsoni) in the Wonderland of Rocks/Queen Mountain region of Joshua Tree National Park, California. Final report submitted to Joshua Tree National Park. Department of Biological Sciences, University of Nevada, Las Vegas.

[49] Schwartz, O. A., V. C. Bleich, and S. A. Holl. 1986. Genetics and the conservation of mountain sheep *Ovis canadensis nelsoni*. Biological Conservation 37:179-190.

[50] Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1990. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology 4:383-390.

[51] Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel. 1996. Metapopulation theory and mountain sheep: implications for conservation. Pp. 353-373 in D. R. McCullough (editor). Metapopulations and wildlife conservation. Island Press, Covelo, California.

[52] Epps, C. W., J. D. Wehausen, V. C. Bleich, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.

[53] Revised Staff Assessment, p. C-2-75.

[54] J. D. Wehausen, University of California White Mountain Research Station, personal communication on 2 June 2010.

[55] Bleich, V. C., J. P. Marshal, and N. G. Andrew. 2010. Habitat use by a desert ungulate: predicting effects of water availability on mountain sheep. Journal of Arid Environments 74:638-645.

[56] Weaver, R. A., and J. L. Mensch. 1971. Bighorn sheep in northeastern Riverside County. Wildlife Management Administrative Report 71-1. Wildlife Management Branch, California Department of Fish and Game, Sacramento, USA.

[57] Turner, J. C. 1973. Water, energy and electrolyte balance in the desert bighorn sheep, *Ovis canadensis*. Ph.D. Thesis, Univ. California, Riverside.

[58] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[59] Turner, J. C. 1973. Water, energy and electrolyte balance in the desert bighorn sheep, *Ovis canadensis*. Ph.D. Thesis, Univ. California, Riverside.

[60] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre, editors. Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

cannot be ruled out merely because the area lacks surface water and has low precipitation.

A strategy that employs long-distance movements among areas of stereotypical bighorn sheep habitat, but that allows bighorn sheep to meet their life history requirements (i.e., nutrient intake, water balance, and protection for offspring), is consistent with the notion that bighorn in the vicinity of the Project site may not be permanent residents of specific geographic areas but, instead, persist (albeit at low densities) as a result of their ability to move long distances to meet their needs. For example, female bighorn sheep select those areas that are safest, or present the fewest risks, to bear and rear lambs, but dependence on surface water can be slight during the birthing season if ambient temperatures are not extreme and forage quality is high.[61] Females and offspring tend to occupy areas closer to surface water as temperatures increase and, concomitantly, nutritional value of forage declines.[62] It is improbable that all of the life-history requirements of bighorn sheep can be met in a single geographic area and, in particular, in the vicinity of the Project site given the sparse rainfall and general absence of surface water noted previously. However, it is probable that the site provides high quality forage following periods of adequate precipitation.[63, 64]

In the absence of data to the contrary and in light of recent information, it is reasonable to assume that the McCoy Mountains support, or at least are capable of supporting, bighorn sheep for short periods during critically important phases of their life history. A conclusion that the McCoy Mountains are not occupied by bighorn sheep is overly simplistic and scientifically unsound. Further, a conclusion that bighorn sheep would not use the Project area "... as a regular part of their home range"[65] is spurious, as the scale at which the home range is defined would have a profound influence on whether or not the Project site would be used. Among animals that move long distances across the landscape, as may those bighorn sheep occupying eastern Riverside County, the annual home range could encompass multiple mountain ranges, and it is logical to assume that bighorn sheep occupy those ranges as they seek to meet their life history requirements.

---

[61] Bleich,V. C., R. T. Bowyer, and J. D. Wehausen. 1997. Sexual segregation in mountain sheep: resources or predation? Wildlife Monographs 134:1-50.

[62] Bleich,V. C., R. T. Bowyer, and J. D. Wehausen. 1997. Sexual segregation in mountain sheep: resources or predation? Wildlife Monographs 134:1-50.

[63] Marshal, J. P., P. R. Krausman, and V. C. Bleich. 2005. Dynamics of mule deer forage in the Sonoran Desert. Journal of Arid Environments 60:593-609.

[64] Marshal, J. P., P. R. Krausman, and V. C. Bleich. 2005. Rainfall, temperature, and forage dynamics affect nutritional quality of desert mule deer forage. Rangeland Ecology and Management 58:360-365.

[65] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

III. Low elevation wash habitat is an important source of nutrients to bighorn sheep inhabiting desert environments, the loss of which has potentially significant impacts to the reproductive performance, recruitment rates, and persistence of subpopulations of the bighorn sheep

In meeting the aforementioned life history requirements, bighorn sheep are dependent upon and take advantage of "wash vegetation" during certain seasons, particularly when new annual growth and production of perennial species is greatest.[66] Low lying areas and, in particular desert washes, are among the most productive habitats in the Sonoran Desert and support higher cover of vegetation and far greater plant biomass than surrounding upland areas.[67,68] Although such areas likely are not used on a year-round basis, they are at times critically important to bighorn sheep in terms of nutrient acquisition, and the acquisition of nutrients packaged in the form of newly emergent or actively growing vegetation (which is high in moisture content, digestibility, and crude protein)[69] is critically important and can have a profound effect on reproductive performance.[70]

Forages used by bighorn sheep in California reflect an increase in quality, with resultant increases in diet quality, during the growing season[71, 72, 73, 74] and have important implications for the reproductive biology and recruitment rates of bighorn sheep in desert environments.[75] The Project area will be completely surrounded by a perimeter fence,[76]

---

[66] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre, editors. Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

[67] Andrew, N. G. 1994. Demography and habitat use of desert-dwelling mountain sheep in the East Chocolate Mountains, Imperial County, California. MS Thesis, University of Rhode Island, Kingston, Rhode Island, USA.

[68] Marshal, J. P., P. R. Krausman, and V. C. Bleich. 2005. Dynamics of mule deer forage in the Sonoran Desert. Journal of Arid Environments 60:593-609.

[69] Marshal, J. P., P. R. Krausman, and V. C. Bleich. 2005. Rainfall, temperature, and forage dynamics affect nutritional quality of desert mule deer forage. Rangeland Ecology and Management 58:360-365.

[70] White, R. G. 1983. Foraging patterns and their multiplier effect on productivity of northern un-gulates. Oikos 40:377-384.

[71] Bleich, V. C., R. T. Bowyer, D. J. Clark, and T. O. Clark. 1992. Quality of forages eaten by mountain sheep in the eastern Mojave Desert, California. Desert Bighorn Council Transactions 36:41-47.

[72] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of mountain sheep: effects of precipitation in a desert ecosystem. Mammalia 67:385-402.

[73] Oehler, M. W., V. C. Bleich, R. T. Bowyer, and M. C. Nicholson. 2005. Mountain sheep and mining: implications for conservation and management. California Fish and Game 91:149-178.

[74] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre, editors. Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

[75] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre (editors). Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

[76] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-51.

and will thereby deny access to potentially important forage resources currently available on the Project site. Low-lying areas, and particularly washes, are used by bighorn sheep for foraging; and such use may occur only for short periods of time but can play critically important roles in the life history of bighorn sheep, particularly during years when forage production is poor. Indeed, patterns and amounts of precipitation, and resultant productivity of vegetation,[77, 78] affect the distribution of bighorn sheep and, ultimately, the probability of persistence of populations of that species.[79] That ground surveys conducted during December did not reveal evidence of bighorn sheep at that time of the year is not surprising.[80] This expert appreciates the conclusion that the Applicant recognizes the potential for bighorn sheep to use the Project area and buffer for seasonal foraging, and recognition that those areas likely are not used as a "...regular part of their home range."[81] Nevertheless, fencing the Project site will make areas that provide important forage resources to bighorn sheep during certain times of the year unavailable, and mitigation to *help* offset the loss of those resources is appropriate.

IV. Project implementation and fencing will result in potentially significant impacts to bighorn habitat connectivity in the South Mohave Metapopulation

It is not my purpose to question the credibility or intent of the Applicant's responses to Staff's inquiries but, rather, to again emphasize the importance of recently available information, this time in the context of potential for the Project to impact connectivity among areas that are utilized by bighorn sheep.

Applicant states that there is a low potential for bighorn sheep to exist in or recolonize the mountains around Blythe.[82, 83] That conclusion was reached, however, in the absence of knowledge of the presence of bighorn sheep (including lambs and, presumably, their mothers) in the Little Maria Mountains,[84, 85, 86] an observation of two

---

[77] Marshal, J. P., P. R. Krausman, and V. C. Bleich. 2005. Rainfall, temperature, and forage dynamics affect nutritional quality of desert mule deer forage. Rangeland Ecology and Management 58:360-365.

[78] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre (editors). Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

[79] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of mountain sheep: effects of precipitation in a desert ecosystem. Mammalia 67:385-402.

[80] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[81] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[82] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[83] As noted previously, mountain ranges on the north side of Interstate Highway 10 include the McCoy, Big Maria, Little Maria, Riverside, Palen, Granite, and Coxcomb mountains; those south of Interstate Highway 10 include the Chuckwalla, Little Chuckwalla, and Mule mountains.

[84] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[85] J. D. Wehausen, University of California White Mountain Research Station, personal communication on 2 June 2010.

[86] Unpublished memo from J. D. Wehausen to various files entitled, Investigation of Little Maria Mountains relative to bighorn sheep occupancy and dated 11 December 2009.

male bighorn sheep in the McCoy Mountains in the not-so-distant past,[87] and the accidental death of a male bighorn sheep midway between the Big Maria and Riverside mountains in November 2009.[88] This information, in fact, suggests that bighorn sheep do move between and among the "mountain ranges around Blythe," contrary to the Applicant's assertion that the potential for such to occur is low.[89] Moreover, recent observations of bighorn sheep in the Chuckwalla, Little Chuckwalla, Granite, Palen, and Coxcomb mountains[90] have demonstrated the continuing presence of bighorn sheep in those geographic areas, and each of those mountain ranges (which clearly are important to bighorn sheep) could be sources of dispersing animals with the potential to colonize the mountains around Blythe, as could the Eagle and Iron mountains, both of which also are occupied by bighorn sheep.[91] The current presence of bighorn sheep in and around "... the mountains around Blythe" provides ample evidence that a source of potential colonists exists, and Applicant's conclusion that, "... there is a low potential for bighorn sheep to exist or recolonize the mountains around Blythe" does not withstand scrutiny.

Bighorn sheep occur as subpopulations within metapopulations in the American southwest[92 93 94 95] and the metapopulation with the largest potential number of subpopulations in California is termed the South Mojave Metapopulation.[96] Among the subpopulations that comprise the South Mojave Metapopulation are "..the mountain ranges around Blythe," including the McCoy Mountains.[97, 98, 99, 100] Metapopulation persistence is a function of colonization and extinction processes,[101] both of which occur as a result of multiple factors. Metapopulation persistence is dependent upon the colonization rate being greater than the extinction rate among subpopulations comprising

---

[87] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.
[88] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.
[89] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.
[90] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.
[91] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.
[92] Schwartz, O. A., V. C. Bleich, and S. A. Holl. 1986. Genetics and the conservation of mountain sheep *Ovis canadensis nelsoni*. Biological Conservation 37:179-190.
[93] Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1990. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology 4:383-390.
[94] Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel. 1996. Metapopulation theory and mountain sheep: implications for conservation. Pp. 353-373 in D. R. McCullough (editor). Metapopulations and wildlife conservation. Island Press, Covelo, California.
[95] Epps, C. W., J. D. Wehausen, V. C. Bleich, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.
[96] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.
[97] Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1990. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology 4:383-390.
[98] Torres, S. G., V. C. Bleich, and J. D. Wehausen. 1994. Status of bighorn sheep in California, 1993. Desert Bighorn Council Transactions 38:17-28.
[99] Torres, S. G., V. C. Bleich, and J. D. Wehausen. 1996. Status of bighorn sheep in California - 1995. Desert Bighorn Council Transactions 40:27-34.
[100] Epps, C. W., J. D. Wehausen, V. C. Bleich, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.
[101] Hanski, I. 1989. Metapopulaton dynamics: does it help to have more of the same? Trends in Ecology and Evolution 4(4):113-114.

the metapopulation,[102] as well as the number of habitat patches that are available for colonization.[103]

It is also clear that geographic areas can be colonized by only a few dispersers and yet become large and productive subpopulations if resources are adequate, as has occurred elsewhere in California.[104] For example, a recent colonization of the South Bristol Mountain, possibly the result of exploratory movements by a single female with a home range that included the Marble Mountains, and the population of bighorn sheep in the South Bristol Mountains is now of substantial size.[105] Similarly, movements by bighorn sheep from the Old Woman Mountains to the Iron Mountains, both of which are part of the South Mojave Metapopulation,[106, 107] has resulted in a population of bighorn sheep now inhabiting the Iron Mountains.[108, 109] It is also clear that bighorn sheep can, and do, cross heavily traveled highways, and are capable of moving long distance through non-stereotypical bighorn sheep habitat, and in doing so can successfully cross heavily traveled roads and interstate highways.[110, 111, 112]

Information that bighorn sheep have recently colonized the Iron Mountains, currently occupy the Little Maria Mountains, and (at least) attempt to travel between the Big Maria and Riverside Mountains provides ample evidence that the Project could significantly impact habitat connectivity for bighorn sheep in the South Mojave

---

[102] Hanski, I., and M. Gilpin. 1991. Metapopulation dynamics: brief history and conceptual domain. Biological Journal of the Linnean Society 42:3-16.

[103] Hanski, I. 1989. Metapopulaton dynamics: does it help to have more of the same? Trends in Ecology and Evolution 4(4):113-114.

[104] Epps, C. W., J. D. Wehausen, P. J. Palsbøll, and D. R. McCullough. 2005. Using genetic methods to describe and infer recent colonizations by desert bighorn sheep. Pp. 51-62 in Goerrissen, J., and J. M. Andre, editors. Symposium Proceedings for the Sweeney Granite Mountains Desert Research Center 1978-2003: A quarter century of research and teaching. University of California, Riverside.

[105] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.

[106] Torres, S. G., V. C. Bleich, and J. D. Wehausen. 1994. Status of bighorn sheep in California, 1993. Desert Bighorn Council Transactions 38:17-28.

[107] Torres, S. G., V. C. Bleich, and J. D. Wehausen. 1996. Status of bighorn sheep in California - 1995. Desert Bighorn Council Transactions 40:27-34.

[108] Epps, C. W., J. D. Wehausen, P. J. Palsbøll, and D. R. McCullough. 2005. Using genetic methods to describe and infer recent colonizations by desert bighorn sheep. Pp. 51-62 in Goerrissen, J., and J. M. Andre, editors. Symposium Proceedings for the Sweeney Granite Mountains Desert Research Center 1978-2003: A quarter century of research and teaching. University of California, Riverside.

[109] Epps, C. W., V. C. Bleich, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.

[110] Torres, S., G. Mulcahy, B. Gonzales, A. Pauli, and N. Andrew. 2000. Human induced migration and homing behavior of a desert bighorn ram in the Whipple mountains, California: or, herman, the trailer park ram. Desert Bighorn Council Transactions 44:13.

[111] Ough, W. C., and J. C. deVos, Jr. 1984. Intermountain travel corridors and their management implications for bighorn sheep. Desert Bighorn Council Transactions 28:32-36.

[112] Epps, C. W., J. D. Wehausen, V. C. Bleich, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.

Metapopulation. I concur with the opinions of other knowledgeable individuals[113, 114] that bighorn sheep occupying extremely arid regions may be able to do so because they are able to move freely to travel widely to take advantage of seasonally available resources necessary to meet their life-history requirements. Bighorn sheep inhabiting other harsh and arid ecosystems, characteristics that aptly describe conditions in the vicinity of the proposed Project, have home ranges that averaged 22 square miles in size.[115] Further, resources, including forage and water that are necessary for bighorn sheep to meet their life-history requirements, likely are more widely dispersed in eastern Riverside County, where the proposed Project is located, than even in the extremely arid Panamint Range studied by Oehler et al.[116] Thus, consideration of home range size of bighorn sheep calculated in an environment that greatly differs from that near the Project site (i.e., west Texas)[117] is inappropriate, and cannot be used as a rationale to dismiss the Project's impacts to habitat connectivity as insignificant.

The Project will result in the loss of more than 7,000 acres of wildlife habitat, much of it habitat that provides an important source of nutrients to bighorn sheep (and mule deer, another species of large mammalian herbivore occurring on and around the Project site and that is highly dependent upon wash habitat, but is largely ignored in the Revised Staff Assessment) on a seasonal basis. Further, the Project will potentially significantly disrupt movements by bighorn sheep in the Project area. Thus, mitigation to *help* offset those impacts is appropriate,[118] although the type and anticipated benefits of the actual mitigation measure(s) are, as yet, unclear and must be considered carefully in context, design, and location prior to implementation.[119]

The Project's potentially significant impacts to Nelson's bighorn sheep habitat connectivity cannot be fully offset. However, the development of a man-made water source could partially offset these impacts, but careful consideration should be given to the location of any such man-made water source. Specifically, it is necessary to first identify whether there are one or more natural water sources that no longer are available to bighorn sheep that make use of the mountains near Blythe, but that would be of potential benefit to bighorn sheep in that region as a whole. If so, mitigation should include the renovation or redevelopment of such water source. Thus, before a final location or type of mitigation is agreed upon, careful consideration must be given to all options that would have a potentially positive impact on bighorn sheep in the Project area, rather than stipulating *a priori* that a water development be constructed and

---

[113] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[114] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[115] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of female mountain sheep, *Ovis canadensis nelsoni*: effects of precipitation in a desert ecosystem. Mammalia 67:385-401.

[116] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of female mountain sheep, *Ovis canadensis nelsoni*: effects of precipitation in a desert ecosystem. Mammalia 67:385-401.

[117] *See* Responses to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-51.

[118] Staff Assessment/Environmental Impact Statement, p. C.2-145.

[119] Unpublished letter from J. Aardahl (Defenders of Wildlife) to A. Solomon (California Energy Commission) dated 4 May 2010. Available at: http://www.energy.ca.gov/sitingcases/solar_millennium_blythe/documents/others/2010-05-04_Comment_Defenders_of_Wildlife_SA-DEIS_TN-56544.PDF.

maintained in a specific area. Lastly, any mitigation scheme must include a condition that requires monitoring and includes specific criteria to measure the efficacy of the mitigation to ensure that the accepted mitigation is achieving its intended purpose.

DECLARATION OF VERNON C. BLEICH
BLYTHE SOLAR POWER PROJECT
09-AFC-6

I, Vernon C. Bleich, declare as follows:

1. **I recently retired from the California Department of Fish and Game, where I worked extensively and primarily with large mammals in the arid ecosystems that characterize eastern and southeastern California. As a private citizen, I currently offer expertise with respect to natural resource conservation issues.**

2. **I hold an M.A. degree in biology and a Ph.D. in wildlife biology. My relevant professional qualifications and experience are set forth in the attached curriculum vitae and the attached testimony, and are incorporated herein by reference.**

3. **I prepared the testimony attached hereto and incorporated herein by reference as it relates to the Staff Assessment/Draft Environmental Impact Statement and Revised Staff Assessment prepared for the project known as the Blythe Solar Power Project in Riverside County.**

4. **The attached testimony is true and accurate.**

5. **I am personally familiar with the facts and conclusions described within the attached testimony and if called as a witness, I could testify competently thereto.**

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on June 8, 2010, at Hood River, OR

Vernon C. Bleich

EXHIBIT 301

ATTACHMENT 1

Curriculum Vitae

VERNON C. BLEICH

Eastern Sierra Center for Applied
Population Ecology (ESCAPE)

11537 36X St. SW
Dickinson, ND 58601
760/937-5020
701/225-7834
vbleich@ndsupernet.com

Personal Interests:

Hockey (I am a former goaltender), family life, banjo, gardening, hunting, and fishing.

Professional Goals:

To help ensure the persistence of populations of large mammals and their habitats through the study of their ecology and behavior, to apply that knowledge in meaningful conservation efforts, and to impart that knowledge through professional activities including publications, teaching, and other public contacts.

Education:

Ph.D. University of Alaska Fairbanks (Wildlife Biology, 1993). Thesis: "Sexual Segregation in Desert-Dwelling Mountain Sheep."

M.A. California State University, Long Beach (Biology, 1973). Thesis: "Ecology of Rodents at the Seal Beach Naval Weapons Station, Fallbrook Annex, San Diego County, California."

B.S. California State University, Long Beach (Zoology, 1970).

Professional Background:

Senior Conservation Scientist, Eastern Sierra Center for Applied Population Ecology (2007 - present). I provide expertise on natural resource conservation issues, particularly as they relate to large mammals in desert, mountain, and plains environments.

Senior Environmental Scientist, California Department of Fish and Game (2001 – 2008; now retired). I served as the project leader for the Sierra Nevada Bighorn Sheep Recovery Program, a project to conserve mountain sheep in that range and restore them to formerly occupied habitats; I continued to function as the Regional Large Mammal and Desert specialist, with an emphasis on mountain sheep and mule deer in southeastern California.

I served as chair of the Sierra Nevada Bighorn Sheep Recovery Team (also referred to as the Sierra Nevada Bighorn Sheep Science Advisory Group), and continued to serve as a member of the Peninsular Bighorn Sheep Recovery Team.

Senior Wildlife Biologist, California Department of Fish and Game (1999 - 2001). I served as the Regional Large Mammal and Desert Specialist, with an emphasis on mountain sheep and mule deer in southeastern California. At the request of the US Fish and wildlife Service I was appointed by the Department of Fish and Game to serve on the Peninsular Bighorn Sheep Recovery Team.

Senior Wildlife Biologist, California Department of Fish and Game (1993 - 1999). I served as the Regional Large Mammal Specialist and supervised the activities of 5 journeyman wildlife biologists in eastern California. Emphasis species included mountain sheep, mule deer, pronghorn, tule elk, and sage grouse in eastern California.

Associate Wildlife Biologist, California Department of Fish and Game (1986 - 1993). I served as the Regional mountain sheep specialist, and supervised the activities of 5 journeyman wildlife biologists in eastern California. Emphasis species included mountain sheep, mule deer, pronghorn, tule elk, and sage grouse in eastern California.

Project Leader, California Department of Fish and Game, Federal Aid in Wildlife Restoration Project W-26-D (1978 - 1986). I supervised 2 technicians, and planned and implemented habitat management projects designed to benefit waterfowl, sage grouse, mule deer, and mountain sheep in eastern California.

Assistant Wildlife Biologist, California Department of Fish and Game (1975 - 1978). I was an Area Biologist responsible for management of mule deer, mountain sheep, and the Endangered Stephens' kangaroo rat, as well as for environmental review activities in Riverside and San Bernardino counties, California.

Junior Aquatic Biologist, California Department of Fish and Game (1974 - 1975). I was responsible for fisheries management activities, with an emphasis on wild trout and the Endangered unarmored three-spined stickleback in Los Angeles and San Bernardino counties, California.

Park Ranger, Department of Recreation, City of Long Beach, California (1970 - 1973). I was responsible for public education activities, routine patrol, and coordination with other law enforcement agencies in El Dorado Regional Park, Long Beach, California.

Academic Appointments:

Research Professor, Department of Natural Resources and Environmental Science, University of Nevada, Reno (2007 - Present).

Affiliate Faculty, Department of Biological Sciences, Idaho State University, Pocatello, Idaho (2005 - Present).

Senior Research Associate, Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska (1998 - Present).

Affiliate Assistant Professor of Wildlife Ecology, Department of Biology and Wildlife, University of Alaska Fairbanks, Fairbanks, Alaska (1993 - 1998).

Research Associate, Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, Alaska (1993 - present).

Adjunct Assistant Professor of Natural Resource Science, Department of Natural Resource Science, University of Rhode Island, Kingston (1992 - 1994).

Instructor, Mt. San Jacinto College, San Jacinto, California. I instructed an introductory course entitled, "Wildlife Management" (1976 - 1986).

Assistant Professor, Department of Biology, Rio Hondo College, Whittier, California. I instructed lecture and laboratory sections of General Zoology (biology major emphasis), General Biology (general education emphasis), and Marine Biology (1973 - 1974).

Teaching Assistant, California State University, Long Beach. I instructed laboratory sections of General Biology (for non-majors) and General Zoology (for majors) (1972 - 1973).

Graduate Research Assistant, California State University, Long Beach. I prepared specimens and curated the collection of mammals (> 10,000 specimens) in the Bird and Mammal Museum, and instructed laboratory sections of General Ecology (for majors), General Mammalogy (for majors), and Advanced Mammalogy (1970-1972).

Graduate Student Supervision:

Chair of Graduate Committee:

Kevin L. Monteith (Ph.D.), Reproductive ecology of migratory and resident mule deer in the eastern Sierra Nevada, California. Idaho State University, Pocatello. Graduation expected December, 2010. Co-chair with Dr. R. T. Bowyer.

Michael W. Oehler (M.S.), Ecology of mountain sheep: effects of mining and precipitation. University of Alaska Fairbanks. *Graduated December 1999*. Current position: Wildlife Biologist, National Park Service, Theodore Roosevelt National Park, Medora, North Dakota. Co-chair with Dr. R. T. Bowyer.

Becky M. Pierce (Ph.D.), Predator-prey dynamics between mountain lions and mule deer: effects on distribution, population regulation, habitat selection and prey selection. University of Alaska Fairbanks. *Graduated May 1999*. Current position: Associate Wildlife Biologist, California Department of Fish and Game. Co-chair with Dr. R. T. Bowyer.

Graduate Committee Membership:

Cody J. McKee (M.S.), Ecology of mule deer in the eastern Mojave Desert, California. University of Nevada, Reno (Graduation expected June 2011).

Jeffrey T. Villepique (Ph.D.), Interactions between mountain lions and mountain sheep: an assessment of forage benefits and predation risk. Idaho State University, Pocatello (Graduation expected December 2010).

Sabrina Morano (Ph.D.), Reproductive biology of mule deer in the White Mountains, Inyo and Mono counties, California. University of Nevada, Reno (Graduation expected June 2011).

Jericho C. Whiting (Ph.D.), Behavior and ecology of reintroduced Rocky Mountain bighorn sheep. Idaho State University, Pocatello. *Graduated December 2008*. Current position: Wildlife Biologist, Idaho National Laboratory, Twin Falls.

Cody A. Schroeder (M.S.), Habitat selection by mountain sheep: forage benefits or risk of predation? Idaho State University, Pocatello. *Graduated September 2007*. Current position: Doctoral Student, University of Nevada, Reno.

Jason P. Marshal (Ph.D.), Foraging ecology and water relationships of mule deer in a Sonoran Desert environment. University of Arizona, Tucson. *Graduated May 2005*. Current position: Lecturer, University of the Witwatersrand, South Africa.

Heather E. Johnson (M.S.), Antler breakage in tule elk in Owens Valley, California: nutritional causes and behavioral consequences. University of Arizona, Tucson. *Graduated January 2004*. Current position: Doctoral Student and Research Associate, University of Montana, Missoula.

Jennifer L. Rechel (Ph.D. [Geography]), Influence of neighborhood effects and friction surfaces on the spatial distribution and movement strategies of desert-dwelling mountain sheep (*Ovis canadensis*). University of California, Riverside. *Graduated August 2003*. Current position: Wildlife Biologist, U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station, Riverside, California.

Holly B. Ernest (Ph.D.), Ecological genetics of mountain lions (*Puma concolor*) in California. University of California, Davis. *Graduated December 2001*. Current position: Research Geneticist, School of Veterinary Medicine, University of California, Davis.

Esther S. Rubin (Ph.D.), The ecology of bighorn sheep (*Ovis canadensis*) in the peninsular ranges of California. University of California, Davis. *Graduated December 2000*. Current position: Conservation Biologist, The Conservation Biology Institute, Borrego Springs, California.

Nancy G. Andrew (M.S.), Demography and habitat use of desert-dwelling mountain sheep in the East Chocolate Mountains, Imperial County, California. University of Rhode Island, Kingston. *Graduated May 1994*. Current position: Staff Environmental Scientist, California Department of Fish and Game.

Awards and Honors:

Honorary Lifetime Membership, 2010 (in recognition to long and continuing service to the Society for the Conservation of Bighorn Sheep)

Wild Sheep Biologist Wall of Fame Award, 2009 (in recognition of significant contributions to the conservation of wild sheep in North America) (Wild Sheep Foundation)

Lifetime Achievement Award, 2008 (In recognition of contributions toward the conservation of mountain sheep in California) (California Chapter of the Foundation for North American Wild Sheep)

Honor Plaque 2007 (Group Award, in recognition of outstanding contributions toward the recovery of mountain sheep in the Sierra Nevada) (Desert Bighorn Council)

State Statesman Award, 2006 (In recognition of outstanding contributions to the wild sheep of California) (Foundation for North American Wild Sheep)

Trail Blazer Award, 2004 (In recognition of efforts on behalf of mountain sheep conservation in California) (California Chapter of the Foundation for North American Wild Sheep)

Director's Achievement Award, 2004 (In recognition of editorial services for California Fish and Game (California Department of Fish and Game)

Annual Achievement Award, 2004 (In recognition of conservation of mule deer and their habitats) (Southern California Chapter, California Deer Association)

Alumni Achievement Award for Professional Excellence, 2002 (University of Alaska Alumni Association)

Outstanding Alumnus Award, 2002 (College of Science, Engineering, and Mathematics, University of Alaska Fairbanks)

Sustained Superior Accomplishment Award, 2002 (California Department of Fish and Game)

The Desert Ram Award, 2001 (Desert Bighorn Council)

Outstanding Publication Award for a Monograph, 1998 (The Wildlife Society)

Award of Appreciation, 1998 (San Fernando Valley Chapter of Safari Club International, CA)

Professional Membership, Boone and Crockett Club, 1998 (Boone and Crockett Club)

Certificate of Appreciation, 1997 (Society for the Conservation of Bighorn Sheep)

"Ol' Irongut" Award, 1996 (California Department of Fish and Game, Division of Air Services)

Resources Agency/University of California Fellowship, 1996 (Sponsored jointly by the California Resources Agency and the University of California, Davis)

Director's Achievement Award, 1992 (California Department of Fish and Game)

Outstanding Biology Department Alumnus, 1988 (California State University, Long Beach)

Professional of the Year, 1985 (Western Section of The Wildlife Society)

California Wildlife Officer of the Year, 1984 (Shikar-Safari Foundation)

Award of Honor, 1984 (Society for the Conservation of Bighorn Sheep)

Honorary Lifetime Member, 1984 (Banning [California] Sportsman's Club)

Professional and Fraternal Memberships:

American Society of Mammalogists (Life Member)
The Boone and Crockett Club (Professional Member)
The Wildlife Society
Society for Conservation Biology
Southwestern Association of Naturalists
Wild Sheep Foundation
National Rifle Association
California Chapter, Foundation for North American Wild Sheep
Society for the Conservation of Bighorn Sheep
Minnesota-Wisconsin Chapter, Foundation for North American Wild Sheep

Licenses and Certifications:

California Community College Credential (#45476, Lifetime)
State of California Certified Blaster's License (#2087)
Certified Wildlife Biologist (1981 - The Wildlife Society)
California Hunter Safety Instructor (#1984)

Other Professional Activities:

Editorial Activities:

Editor-in-Chief, *California Fish and Game* (2009 - present)

Associate Editor, *California Fish and Game* (1995 - 2009).

Editor, *Transactions of the Western Section of The Wildlife Society* (1988).

Associate Editor, *Transactions of the Western Section of The Wildlife Society* (1986-87).

Reviewer for Journals:

Conservation Biology, Journal of Wildlife Management, Wildlife Society Bulletin, Journal of Mammalogy, The Condor, California Fish and Game, Transactions of the Western Section of the Wildlife Society, Western North American Naturalist, Desert Bighorn Council Transactions, Southwestern Naturalist, Proceedings of the Northern Wild Sheep and Goat Council, Journal of Wildlife Diseases, Great Basin Naturalist, Bulletin of the Southern California Academy of Sciences, Journal of Zoology (London), Vida Silvestre Neotropical, Wildlife Biology, Wildlife Monographs, European Journal of Wildlife Research, Biological Conservation, Journal of Arid Environments (An average of about 12 reviews per year).

Other Activities:

2008 – Present: Member, Big Game Records Committee, Boone and Crockett Club

2007 – Present: Advisory Board Member, Texas Bighorn Society

2007 – Present: Science Advisor, Society for the Conservation of Bighorn Sheep

2006 - Present: Member, Ad Hoc Committee on Professional Membership, Boone and Crockett Club.

1998 - 2002: Coach and member of Board of Trustees, Sierra Roller Hockey League.

1995-96: Vice Chairman, The Desert Bighorn Council.

1994-98: Member, Board of Directors, The Wildlife Forensic DNA Foundation.

1993 - Present: Member, Wildlife Management Professional Advisory Committee, Foundation for North American Wild Sheep.

1991: Member, Committee on Support of Symposia and Conferences, The Wildlife Society.

1989-1993: Member, Board of Trustees, Friends of the Eastern California Museum; Vice-chairman, 1991-1992; Chairman, 1993.

1987-1988: Chairman, The Desert Bighorn Council.

1988: Co-chairman, Wildlife Water Development Symposium, Western Section of The Wildlife Society.

Refereed Publications:

Bleich, V. C. *In review*. Perceived threats to mountain sheep: levels of concordance among western states, provinces, and territories. Desert Bighorn Council Transactions.

Marshal, J. P., and **V. C. Bleich**. *In review*. Geographic variation in relationships between El Nino Southern Oscillation and mule deer harvest in California, USA. Southwestern Naturalist.

Jaeger, J. R., J. D. Wehausen, and **V. C. Bleich**. *In review*. Incentives for migration by female mountain sheep: water requirements, nutritional gains, or decreased predation risk? Journal of Mammalogy.

Holl, S. A., and **V. C. Bleich**. *In review*. Responses of large mammals to fire and rain in the San Gabriel Mountains, California. Southwestern Naturalist.

Marshal, J. P., **V. C. Bleich**, P. R. Krausman, A. Neibergs, M. L. Reed, and N. G. Andrew. *In review*. Habitat use and diets of mule deer and feral ass in the Sonoran Desert. Journal of Arid Environments.

Whiting, J. C., R. T. Bowyer, J. T. Flinders, **V. C. Bleich**, and J. G. Kie. *In press*. Sexual segregation and use of water by bighorn sheep: implications for conservation. Animal Conservation.

Villepique, J. T., B. M. Pierce, **V. C. Bleich**, and R. T. Bowyer. *In press*. Diets of mountain lions following a decline in mule deer numbers. Southwestern Naturalist.

Bleich, V. C. *In press*. Considerations for reprovisioning wildlife water developments: mountain sheep in desert ecosystems. California Fish and Game.

Gibson, R. M., **V. C. Bleich**, C. W. McCarthy, and T. L. Russi. *In press*. Recreational hunting can lower population size in Greater Sage-grouse. Studies in Avian Biology.

Schroeder, C. A., R. T. Bowyer, **V. C. Bleich**, and T. R. Stephenson. *In press*. Ramifications of sexual segregation for an endangered alpine ungulate: Sierra Nevada bighorn sheep, *Ovis canadensis sierrae*. Arctic, Antarctic, and Alpine Research.

Bleich, V. C., J. P. Marshal, and N. G. Andrew. 2010. Habitat use by a desert ungulate: predicting effects of water availability on mountain sheep. Journal of Arid Environments

74:638-645.

Krausman, P. R., D. E. Naugle, M. R. Frisina, R. Northrup, **V. C. Bleich**, W. M. Block, M. C. Wallace, and J. D. Wright. 2009. Livestock grazing, wildlife habitat, and rangeland values. Rangelands 31(5):15-19.

Holl, S. A., and **V. C. Bleich**. 2009. Reconstructing the San Gabriel Mountains bighorn sheep population. California Fish and Game 95:77-87.

Clifford, D. L., B. A. Schumaker, T. R. Stephenson, **V. C. Bleich**, M. Leonard-Cahn, B. J. Gonzales, W. M. Boyce, and J. A. K. Mazet. 2009. Assessing disease risk at the wildlife-livestock interface: a study of Sierra Nevada bighorn sheep. Biological Conservation 142:2559-2568.

Bleich, V. C., J. H. Davis, J. P. Marshal, S. G. Torres, and B. J. Gonzales. 2009. Mining activity and habitat use by mountain sheep. European Journal of Wildlife Research 55:183-191.

Pease, K. M., A. H. Freedman, J. P. Pollinger, J. E. McCormack, W. Buermann, J. Rodzen, J. Banks, E. Meredith, **V. C. Bleich**, R. J. Schaefer, K. Jones, and R. K. Wayne. 2009. Landscape genetics of California mule deer (*Odocoileus hemionus*): the roles of ecological and historical factors in generating differentiation. Molecular Ecology 18:1848-1862.

Duffy, L. K., M. W. Oehler, R. T. Bowyer, and **V. C. Bleich**. 2009. Mountain sheep: an environmental epidemiological survey of variation in metal exposure and physiological biomarkers following mine development. American Journal of Environmental Sciences 5:296-303.

Marshal, J. P., J. W. Cain III, **V. C. Bleich**, and S. S. Rosenstock. 2009. Intrinsic and extrinsic sources of variation in the population dynamics of an arid-environment large herbivore. Canadian Journal of Zoology 87:103-111.

Villepique, J. T., **V. C. Bleich**, R. A. Botta, B. M. Pierce, T. R. Stephenson, and R. T. Bowyer. 2008. Evaluating GPS collar error: a critical evaluation of Televilt POSREC-Science™ Collars and a method for screening location data. California Fish and Game 94:155-168.

Bleich, V. C., H. E. Johnson, S. A. Holl, L. Konde, S. G. Torres, and P. R. Krausman. 2008. Fire history in a chaparral ecosystem: implications for conservation of a native ungulate. Rangeland Ecology and Management 61:571-579.

Marshal, J. P., P. R. Krausman, and **V. C. Bleich**. 2008. Body condition of desert mule deer is related to rainfall. Southwestern Naturalist 53:311-318.

Marshal, J. P., **V. C. Bleich**, and N. G. Andrew. 2008. Evidence for interspecific competition between feral ass and mountain sheep in a desert environment. Wildlife Biology 14:228-236.

Bleich, V. C., and R. A. Weaver. 2007. Status of mountain sheep in California: comparisons between 1957 and 2007. Desert Bighorn Council Transactions 49:55-67.

Wehausen, J. D., and **V. C. Bleich**. 2007. Influence of aerial search time on survey results. Desert Bighorn Council Transactions 49:23-29.

Bowyer, R. T., **V. C. Bleich**, X. Manteca, J. C. Whiting, and K. M. Stewart. 2007. Sociality, mate choice, and timing of mating in American bison (*Bison bison*): effects of large males. Ethology 113:1048-1060.

Epps, C. W., J. D. Wehausen, **V. C. Bleich**, S. G. Torres, and J. S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724.

Bleich, V. C., T. R. Stephenson, B. M. Pierce, and M. J. Warner. 2007. Body condition of mule deer while injured and following recovery. Southwestern Naturalist 52:164-167.

Johnson, H. E., **V. C. Bleich**, and P. R. Krausman. 2007. Mineral deficiencies in tule elk, Owens Valley, California. Journal of Wildlife Diseases 43:61-74.

Johnson, H. E., **V. C. Bleich**, P. R. Krausman, and J. L. Koprowski. 2007. Effects of antler breakage on mating behavior in male tule elk (*Cervus elaphus nannodes*). European Journal of Wildlife Research 53:9-15.

Bleich, V. C. 2006. Mountain sheep in California: perspectives on the past, and prospects for the future. Biennial Symposium of the Northern Wild Sheep and Goat Council 15:1-13.

Marshal, J. P., **V. C. Bleich**, P. R. Krausman, M. L. Reed, and N. G. Andrew. 2006. [Invited paper] Factors affecting habitat use and distribution of mule deer in an arid environment. Wildlife Society Bulletin 34:609-619.

Bleich, V. C., N. G. Andrew, M. J. Martin, G. P. Mulcahy, A. M. Pauli, and S. S. Rosenstock. 2006. [Invited paper] Quality of water available to wildlife: comparisons among artificial and natural sources. Wildlife Society Bulletin 34:627-632.

Bleich, V. C., S. Nelson, P. J. Wood, H. R. Wood, and R. A. Noles. 2006. [Invited paper] Retrofitting gallinaceous guzzlers: enhancing water availability and safety for wildlife. Wildlife Society Bulletin 34:633-636.

Marshal, J. P., P. R. Krausman, **V. C. Bleich**, S. S. Rosenstock, and W. B. Ballard. 2006. [Invited paper] Gradients of forage biomass and ungulate use near wildlife water developments. Wildlife Society Bulletin 34:620-626.

Rominger, E. M., **V. C. Bleich**, and E. J. Goldstein. 2006. [Letter] Bighorn sheep, mountain lions, and the ethics of conservation. Conservation Biology 20:1041.

Marshal, J. P., L. M. Lesicka, **V. C. Bleich**, P. R. Krausman, G. P. Mulcahy, and N. G. Andrew. 2006. Demography of desert mule deer in southeastern California. California Fish and Game 92:55-66.

Bleich, V. C., B. M. Pierce, J. Jones, and R. T. Bowyer. 2006. Variance in survival rates among young mule deer in the Sierra Nevada, California. California Fish and Game 92:24-38.

Johnson, H. E., **V. C. Bleich**, and P. R. Krausman. 2005. Antler breakage in tule elk, Owens Valley, California. Journal of Wildlife Management 69:1747-1752.

Rosenstock, S. S., **V. C. Bleich**, M. J. Rabe, and C. Reggiardo. 2005. Water quality at wildlife water sources in the Sonoran Desert, United States. Rangeland Ecology and Management 58:623-627.

Marshal, J. P., P. R. Krausman, and **V. C. Bleich**. 2005. Rainfall, temperature, and forage dynamics affect nutritional quality of desert mule deer forage. Rangeland Ecology and Management 58:360-365.

Bleich, V. C., J. T. Villepique, T. R. Stephenson, B. M. Pierce, and G. M. Kutliyev. 2005. Efficacy of aerial telemetry as an aid to capture specific individuals: a comparison of two techniques. Wildlife Society Bulletin 33:332-336.

Bleich, V. C. 2005. [Invited paper] In my opinion: politics, promises, and illogical legislation confound wildlife conservation. Wildlife Society Bulletin 33:66-73.

Wehausen, J. D., **V. C. Bleich**, and R. R. Ramey II. 2005. Correct nomenclature for Sierra Nevada bighorn sheep. California Fish and Game 91:216-218.

Oehler, M. W., **V. C. Bleich**, R. T. Bowyer, and M. C. Nicholson. 2005. Mountain sheep and mining: implications for conservation and management. California Fish and Game 91:149-178.

Marshal, J. P., P. R. Krausman, and **V. C. Bleich**. 2005. Dynamics of mule deer forage in the Sonoran Desert. Journal of Arid Environments 60:593-609.

Bleich, V. C., and S. G. Torres. 2004. [Guest Editorial] International involvement in wildlife conservation. Wildlife Society Bulletin 32:1013-1014.

Krausman, P. R., **V. C. Bleich**, J. W. Cain III, T. R. Stephenson, D. W. DeYoung, P. W. McGrath, P. K. Swift, B. M. Pierce, and B. D. Jansen. 2004. Neck lesions in ungulates from collars incorporating satellite technology. Wildlife Society Bulletin 32:987-991.

Marshal, J. P., **V. C. Bleich**, N. G. Andrew, and P. R. Krausman. 2004. Seasonal forage use by desert mule deer in southeastern California. Southwestern Naturalist 49:501-505.

Holl, S. A., **V. C. Bleich**, and S. G. Torres. 2004. Population dynamics of bighorn sheep in the San Gabriel Mountains, California, 1967-2002. Wildlife Society Bulletin 32:412-426.

Pierce, B. M., R. T. Bowyer, and **V. C. Bleich**. 2004. Habitat selection by mule deer: forage benefits or risk of predation? Journal of Wildlife Management 68:533-541.

Bleich, V. C., E. F. Cassirer, L. E. Oldenburg, V. L. Coggins, and D. L. Hunter. 2004. Predation by a golden eagle, *Aquila chrysaetos*, on a juvenile mountain sheep, *Ovis canadensis*. California Fish and Game 90:91-93.

Epps, C. W., D. R. McCullough, J. D. Wehausen, **V. C. Bleich**, and J. L. Rechel. 2004. Effects of climate change on population persistence of desert-dwelling mountain sheep in California. Conservation Biology 18:102-113.

Long, E. S., D. M. Fecske, R. A. Sweitzer, J. A. Jenks, B. M. Pierce, and **V. C. Bleich**. 2003. Efficacy of photographic scent stations to detect mountain lions. Western North American Naturalist 63:529-532.

Bleich, V. C. 2003. The potential for botulism in desert-dwelling mountain sheep. Desert Bighorn Council Transactions 47:2-8.

Epps, C. W., **V. C. Bleich**, J. D. Wehausen, and S. G. Torres. 2003. Status of bighorn sheep in California. Desert Bighorn Council Transactions 47:20-35.

Oehler, M. W., Sr., R. T. Bowyer, and **V. C. Bleich**. 2003. Home ranges of mountain sheep: effects of precipitation in a desert ecosystem. Mammalia 67:385-402.

Weckerly, F. W., **V. C. Bleich**, C.-L. B. Chetkiewicz, and Mark A. Ricca. 2003. Body weight and rumen-reticulum capacity in tule elk and mule deer. Journal of Mammalogy 84:659-664.

Ernest, H. B., W. M. Boyce, **V. C. Bleich**, B. M. May, S. J. Stiver, and S. G. Torres. 2003. Genetic structure of mountain lion (*Puma concolor*) populations in California. Conservation Genetics 4:353-366.

Bleich, V. C., T. R. Stephenson, N. J. Holste, I. C. Snyder, J. P. Marshal, P. W. McGrath, and B. M. Pierce. 2003. Effects of tooth extraction on selected biological parameters of female mule deer. Wildlife Society Bulletin 31:233-236.

Marshal, J., P. R. Krausman, **V. C. Bleich**, W. B. Ballard, and J. S. McKeever. 2002. Rainfall, el Nino, and dynamics of mule deer in the Sonoran Desert, California. Journal of Wildlife Management 66:1283-1289.

Stephenson, T. R., **V. C. Bleich**, B. M. Pierce, and G. P. Mulcahy. 2002. Validation of mule deer body composition using *in vivo* and post-mortem indices of nutritional condition. Wildlife Society Bulletin 30:557-564.

Swift, P. K., **V. C. Bleich**, T. R. Stephenson, A. E. Adams, B. J. Gonzales, B. M. Pierce, and J. P. Marshal. 2002. Tooth extraction from mule deer in the absence of chemical

immobilization. Wildlife Society Bulletin 30:253-255.

Bleich, V. C., C. S. Y. Chun, R. W. Anthes, T. E. Evans, and J. K. Fischer. 2001. [Invited Paper] Visibility bias and development of a sightability model for tule elk. Alces 37:315-327.

Drew, M. L., **V. C. Bleich**, S. G. Torres, and R. G. Sasser. 2001. Early pregnancy detection in mountain sheep using a pregnancy-specific protein B assay. Wildlife Society Bulletin 29:1182-1185.

Rosenstock, S. S., J. J. Hervert, **V. C. Bleich**, and P. R. Krausman. 2001. Muddying the water with poor science: a reply to Broyles and Cutler. Wildlife Society Bulletin 29:734-738 [peer edited].

Bleich, V. C. 2001. On wildlife management in national monuments. The Wildlifer 306:59 [letter].

Andrew, N. G., **V. C. Bleich**, A. D. Morrison, L. M. Lesicka, and P. Cooley. 2001. Wildlife mortalities associated with artificial water sources in the Sonoran Desert. Wildlife Society Bulletin 29:275-280.

Thompson, J. R., **V. C. Bleich**, S. G. Torres, and G. P. Mulcahy. 2001. Translocation techniques for mountain sheep: does the method matter? Southwestern Naturalist 46:87-93.

Bleich, V. C., and B. M. Pierce. 2001. Accidental mass mortality of migrating mule deer. Western North American Naturalist 61:124-125.

Chao-chin, C., B. B. Chomel, R. W. Kasten, R. Heller, K. M. Kocan, H. Ueno, K. Yamamoto, **V. C. Bleich**, B. M. Pierce, B. J. Gonzales, P. K. Swift, W. M. Boyce, S. S. Jang, H.-J. Boulouis, and Y. Piemont. 2000. *Bartonella* spp. isolated from domestic and wild ruminants in North America. Emerging Infectious Diseases 6:306-311.

Singer, F. J., **V. C. Bleich**, and M. A. Gudorf. 2000. [Invited Paper] Restoration of bighorn sheep metapopulations in and near western national parks. Restoration Ecology 8(4S):14-24.

Bleich, V. C., and M. W. Oehler. 2000. [Invited paper] Wildlife education in the United States: thoughts from agency biologists. Wildlife Society Bulletin 28:542-545.

Rubin, E. S., W. M. Boyce, and **V. C. Bleich**. 2000. Reproductive strategies of desert bighorn sheep. Journal of Mammalogy 81:769-786.

Schaefer, R. J., S. G. Torres, and **V. C. Bleich**. 2000. Survivorship and cause-specific mortality in sympatric populations of mountain sheep and mule deer. California Fish and Game 86:127-135.

Pierce, B. M., **V. C. Bleich**, and R. T. Bowyer. 2000. Prey selection by mountain lions and coyotes: effects of hunting style, body size, and reproductive status. Journal of Mammalogy 81:462-472.

Swift, P. K., J. D. Wehausen, H. B. Ernest, R. S. Singer, A. M. Pauli, H. Kinde, T. E. Rocke, and **V. C. Bleich**. 2000. Desert bighorn sheep mortality due to presumptive type C botulism in California. Journal of Wildlife Diseases 36:184-189.

Pierce, B. M., **V. C. Bleich**, and R. T. Bowyer. 2000. Social organization of mountain lions: does a land-tenure system regulate population size? Ecology 81:1533-1543.

Bleich, V. C. 1999. Wildlife conservation and wilderness management: uncommon objectives and conflicting philosophies. North American Wild Sheep Conference Proceedings 2:195-205.

Bleich, V. C., and A. M. Pauli. 1999. Distribution and intensity of hunting and trapping activity in the East Mojave National Scenic Area, California. California Fish and Game 85:148-160.

Pierce, B. M., **V. C. Bleich**, J. D. Wehausen, and R. T. Bowyer. 1999. Migratory patterns of mountain lions: implications for social regulation and conservation. Journal of Mammalogy 80:986-992.

Bleich, V. C. 1999. Mountain sheep and coyotes: patterns of predator evasion in a mountain ungulate. Journal of Mammalogy 80:283-289.

Bleich, V. C., and B. M. Pierce. 1999. Expandable and economical radio collars for juvenile mule deer. California Fish and Game 85:56-62.

Hill, S. D., and **V. C. Bleich**. 1999. Monitoring wildlife water sources using low Earth orbiting satellites (LEOS). Wildlife Society Bulletin 27:25-27.

Andrew, N. G., **V. C. Bleich**, and P. V. August. 1999. Habitat selection by mountain sheep in the Sonoran Desert: implications for conservation in the United States and Mexico. California Wildlife Conservation Bulletin 12:1-30.

Grigione, M. M., P. Burman, **V. C. Bleich**, and B. M. Pierce. 1999. Identifying individual mountain lions (*Felis concolor*) by their tracks: refinement of an innovative technique. Biological Conservation 88:25-32.

Bleich, V. C. 1998. Importance of observer experience in determining age and sex of mountain sheep. Wildlife Society Bulletin 26:877-880.

de Ropp, J. S., J. H. Theis, J. I. Mead, and **V. C. Bleich**. 1998. Limitations of nuclear magnetic resonance (NMR) analysis of fecal bile for taxonomic identification of contemporary and extinct mammals. California Fish and Game 84:112-118.

Bleich, V. C., and T. J. Taylor. 1998. Survivorship and cause-specific mortality in five populations of mule deer. Great Basin Naturalist 58:265-272.

Pierce, B. M., **V. C. Bleich**, C. L.-B. Chetkiewicz, and J. D. Wehausen. 1998. Timing of feeding bouts of mountain lions. Journal of Mammalogy 79:222-226.

Bleich, V. C., R. T. Bowyer, and J. D. Wehausen. 1997. Sexual segregation in mountain sheep: resources or predation? Wildlife Monographs 134:1-50.

Andrew, N. G., **V. C. Bleich**, P. V. August, and S. G. Torres. 1997. Demography of mountain sheep in the East Chocolate Mountains, California. California Fish and Game 83:68-77.

Andrew, N. G., L. M. Lesicka, and **V. C. Bleich**. 1997. An improved fence design to protect water sources for native ungulates. Wildlife Society Bulletin 25:823-825.

Bleich, V. C., S. G. Torres, J. D. Wehausen, and T. A. Swank. 1996. [Invited paper] History of transplanting mountain sheep - California. Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council 10:164-166.

Torres, S. G., **V. C. Bleich**, and J. D. Wehausen. 1996. Status of bighorn sheep in California, 1995. Desert Bighorn Council Transactions 40:27-34.

Oehler, M. W., **V. C. Bleich**, and R. T. Bowyer. 1996. Error associated with LORAN-C: effects of aircraft altitude and geographic location. Desert Bighorn Council Transactions 40:19-21.

Bleich, V. C. 1996. Interactions between coyotes (*Canis latrans*) and mountain sheep (*Ovis canadensis*). Southwestern Naturalist 41:81-82.

Davis, J. L., C. L.-B. Chetkiewicz, **V. C. Bleich**, G. Raygorodetsky, B. M. Pierce, J. W. Ostergard, and J. D. Wehausen. 1996. A device to safely remove immobilized mountain lions from trees and cliffs. Wildlife Society Bulletin 24:537-539.

Bleich, V. C., B. M. Pierce, J. L. Davis, and V. L. Davis. 1996. Thermal characteristics of mountain lion dens. Great Basin Naturalist 56:276-278.

Main, M. B., F. W. Weckerly, and **V. C. Bleich**. 1996. [Invited Paper] Sexual segregation in ungulates: new directions for research. Journal of Mammalogy 77:449-461.

Cronin, M. A., and **V. C. Bleich**. 1995. Mitochondrial DNA variation among populations and subspecies of mule deer in California. California Fish and Game 81:45-54.

Bleich, V. C., and M. V. Price. 1995. Aggressive behavior of *Dipodomys stephensi*, an endangered species, and *Dipodomys agilis*, a sympatric congener. Journal of Mammalogy 76:646-651.

Torres, S. G., **V. C. Bleich**, and J. D. Wehausen. 1994. Status of bighorn sheep in California,

1993. Desert Bighorn Council Transactions 38:17-28.

Bleich, V. C., and S. G. Torres. 1994. [Invited Paper] California's mountain sheep management program. Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council 9:186-195.

Bleich, V. C., R. T. Bowyer, A. M. Pauli, M. C. Nicholson, and R. W. Anthes. 1994. [Lead Article] Responses of mountain sheep *Ovis canadensis* to helicopter surveys: ramifications for the conservation of large mammals. Biological Conservation 45:1-7.

Jaeger, J. R., J. D. Wehausen, **V. C. Bleich**, and C. L. Douglas. 1993. Limits in the resolution of LORAN-C for aerial telemetry studies. Desert Bighorn Council Transactions 37:20-23.

Torres, S. G., **V. C. Bleich**, and A. M. Pauli. 1993. Status of bighorn sheep in California, 1992. Desert Bighorn Council Transactions 37:47-52.

Torres, S. G., **V. C. Bleich**, and A. M. Pauli. 1993. An analysis of hunter harvest of mountain sheep in California, 1987-1992. Desert Bighorn Council Transactions 37:37-40.

Jessup, D. A., W. L. Goff, D. Stiller, M. N. Oliver, **V. C. Bleich**, and W. M. Boyce. 1993. A retrospective serologic survey for *Anaplasma* spp. infection in three bighorn sheep (*Ovis canadensis*) populations in California. Journal of Wildlife Diseases 29:547-554.

Thompson, J. R., and **V. C. Bleich**. 1993. A comparison of mule deer survey techniques in the Sonoran Desert of California. California Fish and Game 79:70-75.

Bleich, V. C. 1993. Comments on research, publications, and California's longest continuously published journal. California Fish and Game 79:42-43.

Bleich, V. C., M. C. Nicholson, A. T. Lombard, and P. V. August. 1992. Preliminary tests of mountain sheep habitat models using a geographic information system. Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council 8:256-263.

Bleich, V. C., R. T. Bowyer, D. J. Clark, and T. O. Clark. 1992. Quality of forages eaten by mountain sheep in the eastern Mojave Desert, California. Desert Bighorn Council Transactions 36:41-47.

Bleich, V. C., S. G. Torres, D. A. Jessup, and G. P. Mulcahy. 1992. Status of mountain sheep in California, 1991. Desert Bighorn Council Transactions 36:76-77.

Krausman, P. R., **V. C. Bleich**, J. A. Bailey, D. Armentrout, and R. R. Ramey II. 1992. What is a minimum viable population? Desert Bighorn Council Transactions 36:68-75.

Jaeger, J. R., J. D. Wehausen, and **V. C. Bleich**. 1991. Evaluation of time-lapse photography to estimate population parameters. Desert Bighorn Council Transactions 35:5-8.

Bleich, V. C., and D. A. Jessup. 1991. Status of bighorn sheep in California, 1990. Desert

Bighorn Council Transactions 35:11-12.

Bleich, V. C., and D. Racine. 1991. Mountain beaver (*Aplodontia rufa*) from Inyo County, California. California Fish and Game 77:153-155.

Bleich, V. C., J. G. Stahmann, R. T. Bowyer, and J. E. Blake. 1990. Osteoporosis, osteomalacia, and cranial asymmetry in a mountain sheep (*Ovis canadensis*). Journal of Wildlife Diseases 26:372-376.

Bleich, V. C. 1990. On Calcium deficiency and brittle antlers. Journal of Wildlife Diseases 26:588.

Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1990. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Conservation Biology 4:383-390.

Bleich, V. C., R. T. Bowyer, A. M. Pauli, R. L. Vernoy, and R. W. Anthes. 1990. Responses of mountain sheep to aerial sampling using helicopters. California Fish and Game 76:197-204.

Bleich, V. C., J. D. Wehausen, J. A. Keay, J. G. Stahmann, and M. W. Berbach. 1990. Radiotelemetry collars and mountain sheep: a cautionary note. Desert Bighorn Council Transactions 34:6-8.

Bleich, V. C., J. D. Wehausen, K. R. Jones, and R. A. Weaver. 1990. Status of bighorn sheep in California, 1989 and translocations from 1971 through 1989. Desert Bighorn Council Transactions 34:24-26.

Pauli, A. M., and **V. C. Bleich**. 1988. Additional records of the spotted bat (*Euderma maculatum*) from California. Great Basin Naturalist 48:563.

Wehausen, J. D., **V. C. Bleich**, B. Blong, and T. L. Russi. 1987. Recruitment dynamics in a southern California mountain sheep population. Journal of Wildlife Management 51:86-98.

Holl, S. A., and **V. C. Bleich**. 1987. Mineral lick use by mountain sheep in the San Gabriel Mountains, California. Journal of Wildlife Management 51:381-383.

Wehausen, J. D., **V. C. Bleich**, and R. A. Weaver. 1987. Mountain sheep in California: a historical perspective on 108 years of full protection. Western Section of The Wildlife Society Transactions 23:65-74.

Schwartz, O. A., **V. C. Bleich**, and S. A. Holl. 1986. Genetics and the conservation of mountain sheep *Ovis canadensis nelsoni*. Biological Conservation 37:179-190.

Bleich, V. C. 1986. Early breeding in free-ranging mountain sheep. Southwestern Naturalist 31:530-531.

Schwartz, O. A., and **V. C. Bleich**. 1985. Optimal foraging in Barn Owls? Rodent frequencies in diet and fauna. Bulletin of the Southern California Academy of Science 84:41-45.

Bowyer, R. T., and **V. C. Bleich**. 1984. Distribution and taxonomic affinities of mule deer, *Odocoileus hemionus*, from Anza-Borrego Desert State Park, California. California Fish and Game 70:53-57.

Bowyer, R. T., and **V. C. Bleich**. 1984. Effects of cattle grazing on selected habitats of southern mule deer. California Fish and Game 70:240-247.

Bleich, V. C., and R. A. Weaver. 1983. "Improved" sand dams for wildlife habitat management. Journal of Range Management 36:130.

Bleich, V. C. 1983. Comments on helicopter use by wildlife agencies. Wildlife Society Bulletin 11:304-306.

Bleich, V. C. 1982. Additional notes on species richness of mammals at Bodie, California. Southwestern Naturalist 27:121-122.

Bleich, V. C., L. J. Coombes, and J. H Davis. 1982. Horizontal wells as a wildlife habitat improvement technique. Wildlife Society Bulletin 10:324-329.

Bleich, V. C. 1982. An illustrated guide to aging the lambs of mountain sheep. Desert Bighorn Council Transactions 26:59-62.

Bleich, V. C., L. J. Coombes, and G. W. Sudmeier. 1982. Volunteers and wildlife habitat management: twelve years together. CAL-NEVA Wildlife Transactions 1982:64-68.

Bleich, V. C. 1982. Horizontal wells for mountain sheep: desert bighorn "Get the shaft". Desert Bighorn Council Transactions 26:63-64.

Bleich, V. C., L. J. Coombes, and G. W. Sudmeier. 1982. Volunteer participation in California wildlife habitat management projects. Desert Bighorn Council Transactions 26:56-58.

Paysen, T. E., J. A. Derby, H. Black, **V. C. Bleich**, and J. W. Mincks. 1980. A vegetation classification system applied to southern California. USDA Forest Service General Technical Report PSW-45:1-33.

Bleich, V. C. 1979. *Microtus californicus scirpensis* not extinct. Journal of Mammalogy 60:851-852.

Bleich, V. C., and B. Blong. 1978. A magnificent frigatebird in San Bernardino County, California. Western Birds 9:129.

Bleich, V. C. 1978. Breeding bird census: annual grassland. American Birds 32:121.

Bleich, V. C. 1977. Dipodomys stephensi. Mammalian Species 73:1-3.

Schwartz, O. A., and **V. C. Bleich**. 1976. The development of thermoregulation in two species of woodrats, *Neotoma lepida* and *Neotoma albigula*. Comparative Biochemistry and Physiology 54A:211-213.

Bleich, V. C. 1975. Roadrunner predation on ground squirrels in California. Auk 92:147-149.

Bleich, V. C., and O. A. Schwartz. 1975. Water balance and fluid consumption in the southern grasshopper mouse, *Onychomys torridus*. Great Basin Naturalist 35:62-64.

Bleich, V. C., and O. A. Schwartz. 1975. Observations on the home range of the desert woodrat, *Neotoma lepida intermedia*. Journal of Mammalogy 56:518-519.

Bleich, V. C. 1975. Diving times and distances in the Pied-billed Grebe. Wilson Bulletin 87:278-280.

Bleich, V. C., and O. A. Schwartz. 1975. Parturition in the white-throated woodrat. Southwestern Naturalist 20:271-272.

Schwartz, O. A., and **V. C. Bleich**. 1975. Comparative growth in two species of woodrats, *Neotoma lepida intermedia* and *Neotoma albigula venusta*. Journal of Mammalogy 56:653-656.

Bleich, V. C. 1974. Muskrats (*Ondatra zibethicus*) in Amargosa Canyon, Inyo and San Bernardino counties, California. Murrelet 55:7-8.

Bleich, V. C. 1974. Abnormal dentition in a grizzly bear. Murrelet 55:11.

Bleich, V. C., and O. A Schwartz. 1974. Interspecific and intergeneric maternal care in woodrats *(Neotoma)*. Mammalia 38:381-387.

Bleich, V. C., and O. A. Schwartz. 1974. Western range extension of Stephens' Kangaroo rat (*Dipodomys stephensi*), a threatened species. California Fish and Game 60:208-210.

Book Chapters and Proceedings of Symposia:

Bleich, V. C., and B. M. Pierce. 2005. [Invited contribution] Management of mountain lions in California. Pages 63-69 *in* E. L. Buckner and J. Reneau, editors. Records of North American big game. 12th edition. Boone and Crockett Club, Missoula, Montana, USA.

Rubin, E. S., and **V. C. Bleich**. 2005. [Invited contribution] Sexual segregation: a necessary consideration in wildlife conservation. Pages 379-391 *in* K. E. Ruckstuhl and P. Neuhaus, editors. Sexual segregation in vertebrates: ecology of the two sexes. Cambridge University Press, Cambridge, United Kingdom.

Bleich, V. C., J. G. Kie, E. R. Loft, T. R. Stephenson, M. W. Oehler, Sr., and A. L. Medina.

2005. [Invited contribution] Managing rangelands for wildlife. Pages 873-897 *in* C. E. Braun, editor. Techniques for wildlife investigations and management. Sixth edition. The Wildlife Society, Bethesda, Maryland, USA.

Pierce, B. M., and **V. C. Bleich**. 2003. [Invited Contribution] Mountain lion. Pages 744-757 *in* G. A. Feldhamer, B. C. Thompson, and J. A. Chapman, editors. Wild Mammals of North America. Second Edition. The Johns Hopkins University Press, Baltimore, Maryland.

Torres, S. G., and **V. C. Bleich**. 1999. [Invited Contribution] Desert bighorn sheep: California. Pages 170-173 *in* D. E. Toweill and V. Geist, editors. Return of royalty: a celebration of success. Boone and Crockett Club, Missoula, Montana.

Bleich, V. C., and S. G. Torres. 1999. [Invited Contribution] California bighorn sheep: California. Pages 130-133 *in* D. E. Toweill and V. Geist, editors. Return of royalty: a celebration of success. Boone and Crockett Club, Missoula, Montana.

Bleich, V. C. 1998. [Invited Contribution] *Microtus californicus* (Peale 1848). Pages 90-92 *in* D. J. Haffner, E. Yensen, and G. L. Kirkland, Jr., editors. North American rodents: status survey and conservation action plan. International Union for the Conservation of Nature, Gland, Switzerland.

Kie, J. G., **V. C. Bleich**, A. L. Medina, J. D. Yoakum, and J. W. Thomas. 1996. [Invited Contribution] Managing rangelands for wildlife. Pages 663-688 *in* T. A. Bookhout, editor. Research and management techniques for wildlife and habitats. Fifth edition. The Wildlife Society, Bethesda, Maryland.

Bleich, V. C., J. D. Wehausen, R. R. Ramey II, and J. L. Rechel. 1996. [Invited Contribution] Metapopulation theory and mountain sheep: implications for conservation. Pages 353-373 *in* D. R. McCullough, editor. Metapopulations and wildlife conservation. Island Press, Covelo, California.

Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1995. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Pages 102-109 *in* D. Ehrenfeld, editor. Readings from Conservation Biology: wildlife and forests. The Sheridan Press, Hanover, Pennsylvania. [Reprinted from Conservation Biology 4:383-390].

Bleich, V. C., J. D. Wehausen, and S. A. Holl. 1995. Desert-dwelling mountain sheep: conservation implications of a naturally fragmented distribution. Pages 71-78 *in* D. Ehrenfeld, editor. Readings from Conservation Biology: the landscape perspective. The Sheridan Press, Hanover, Pennsylvania. [Reprinted from Conservation Biology 4:383-390].

Bleich, V. C. 1992. History of wildlife water developments, Inyo County, California. Pp. 100-106 *in* C. A. Hall, V. Doyle-Jones, and B. Widawski, editors. The history of water: eastern Sierra Nevada, Owens Valley, White-Inyo Mountains. University of California White Mountain Research Station, Bishop.

Bleich, V. C., and D. B. Koch. 1992. [Abstract] Tule elk on private lands: species preservation, habitat protection, or wildlife commercialization? Page 78 *in* R. D. Brown, editor. The biology of deer. Springer-Verlag, New York, New York.

Bleich, V. C., C. D. Hargis, J. A. Keay, and J. D. Wehausen. 1991. Interagency coordination and the restoration of wildlife populations. Pages 277-284 *in* J. Edelbrock and S. Carpenter, editors. Natural areas and Yosemite: prospects for the future. U.S. National Park Service, Denver Service Center, Denver, Colorado.

Bleich, V. C. 1990. [Invited Paper] Horizontal wells for wildlife water development. Pages 51-58 *in* G. K. Tsukamoto and S. J. Stiver, editors. Wildlife water development. Nevada Department of Wildlife, Reno.

Bleich, V. C., and A. M. Pauli. 1990. Mechanical evaluation of artificial watering devices built for mountain sheep in California. Pages 65-72 *in* G. K. Tsukamoto and S. J. Stiver, editors. Wildlife water development. Nevada Department of Wildlife, Reno.

Bleich, V. C. 1990. Affiliations of volunteers participating in California wildlife water development projects. Pages 187-192 *in* G. K. Tsukamoto and S. J. Stiver, editors. Wildlife water development. Nevada Department of Wildlife, Reno.

Bleich, V. C. 1990. Costs of translocating mountain sheep. Pages 67-75 *in* P. R. Krausman and N. S. Smith, editors. Managing wildlife in the southwest. Arizona Chapter of The Wildlife Society, Phoenix.

Bleich, V. C., and S. A. Holl. 1982. [Invited Paper] Management of chaparral habitat for mule deer and mountain sheep in southern California. Pages 247-254 *in* C. E. Conrad and W. C. Oechel, Technical Coordinators. Proceedings of the symposium on the dynamics and management of Mediterranean-type ecosystems. USDA Forest Service, General Technical Report PSW-58.

Bleich, V. C. 1982. [Invited Paper] Review comments. Pages 567-568 *in* C. E. Conrad and W. C. Oechel, Technical Coordinators. Proceedings of the symposium on the dynamics and management of Mediterranean-type ecosystems. USDA Forest Service, General Technical Report PSW-58.

Bowyer, R. T., and **V. C. Bleich**. 1980. Ecological relationships between southern mule deer and California black oak. Pages 292-296 *in* T. R. Plumb, Technical Coordinator. Proceedings of the Symposium on the ecology, management, and utilization of California oaks. USDA Forest Service, General Technical Report PSW-44.

Agency Reports:

Sierra Nevada Bighorn Sheep Recovery Program [**V. C. Bleich**, H. E. Johnson, B. M. Pierce, C. R. Schroeder, T. R. Stephenson, and J. T. Villepique]. 2006. Sierra Nevada bighorn sheep in 2006. Outdoor California 67(2):10-17.

Bleich, V. C. 2005. Sierra Nevada bighorn sheep. Pages 226-227 *in* California Department of Fish and Game (compiler). The status of rare, threatened, and endangered plants and animals of California 2002-2004. California Department of Fish and Game, Sacramento, California, USA.

Bleich, V. C. 2005. Peninsular bighorn sheep. Pages 228-230 in California Department of Fish and Game (compiler). The status of rare, threatened, and endangered plants and animals of California 2002-2004. California Department of Fish and Game, Sacramento, California, USA.

Sierra Nevada Bighorn Sheep Recovery Program [**V. C. Bleich**, B. M. Pierce, T. R. Stephenson, J. T. Villepique, and J. D. Wehausen]. 2004. Sierra Nevada Bighorn Sheep Progress Report 2003. Outdoor California 65(1):4-17.

U.S. Fish and Wildlife Service [C. Benz, **V. Bleich**, W. Boyce, D. Craig, D. Graber, H. Quigley, P. Stine, S. Torres, and J. Wehausen]. 2003. Draft recovery plan for the Sierra Nevada bighorn sheep. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service [D. Armentrout, **V. Bleich**, W. Boyce, T. Davis, J. DeForge, D. Freeman, M. Jorgensen, S. Ostermann, E. Rubin, O. Ryder, P. Sorensen, S. Torres, and J. Wehausen]. 2000. Recovery plan for bighorn sheep in the peninsular ranges, California. U.S. Fish and Wildlife Service, Portland, Oregon.

Singer, F., W. Adrian, F. Allendorf, J. Bailey, J. Berger, **V. Bleich**, M. Bogan, P. Brussard, S. Buskirk, N. T. Hobbs, T. Smith, D. Stevens, C. Van Riper III, E. Vyse, and G. White. 1996. Bighorn sheep in the Rocky Mountain region. National Biological Service, Ft. Collins, Colorado. 55 pp.

Gudorf, M., P. Y. Sweanor, F. J. Singer, A. Blankenship, **V. Bleich**, T. Easterly, J. Emmerich, C. Eustace, L. Irby, D. Jaynes, B. Jellison, R. Kissell, J. Lindsay, J. Parks, T. Peters, K. Reid, S. Stewart, and T. Voss. 1996. Bighorn sheep habitat assessment of the greater Bighorn Canyon National Recreation Area. National Park Service and National Biological Service Cooperative Report, Bighorn Canyon National Recreation Area, Lovell, Wyoming. 43 pp.

Gudorf, M., P. Sweanor, F. Singer, **V. Bleich**, J. Cordova, C. Hake, L. Lee, T. Lytle, P. Perrotti, S. Petersburg, and B. Sloan. 1995. Bighorn sheep habitat assessment of the greater Colorado National Monument area. National Park Service and National Biological Service Cooperative Report, Colorado National Monument, Fruita, Colorado. 52 pp.

Holl, S. A., and **V. C. Bleich**. 1983. San Gabriel mountain sheep: biological and management considerations. USDA Forest Service, San Bernardino National Forest, San Bernardino, California. 136 pp.

Bleich, V. C. 1980. Amargosa vole study. California Department of Fish and Game, Nongame Wildlife Investigations Job Final Report W-54-R-10. 8 pp.

Gould, G. I., Jr., and **V. C. Bleich**. 1977. Amargosa vole study: progress report. Nongame Wildlife Investigations Job Progress Report W-54-R-10 California Department of Fish and Game, Sacramento. 4pp.

Bleich, V. C. 1975. Wildlife section including habitat and vegetation types in the Lake Mathews study area. Pages 84-130 *in* A study of the fish and wildlife resources of the Metropolitan Water District property at Lake Mathews with habitat improvement recommendations. California Department of Fish and Game, Long Beach.

Bleich, V. C. 1972. An annotated checklist of the mammals occurring in the Tecopa-Dumont Sand Dunes Study Area. Pages 75-77, appendix *in* M. A. Romero, editor. Amargosa Canyon-Dumont Dunes Proposed Natural Area. House of Impressions, Sun Valley, California.

Bleich, V. C. 1972. Checklist of the terrestrial vertebrates of the Seal Beach Naval Weapons Station, Fallbrook Annex, San Diego County, California. U.S. Navy, WPNSTAFBAINST 11015.2:7-13.

Book Reviews and Obituaries:

Weaver, R. A., and **V. C. Bleich**. 2009. Bonnar Blong. Desert Bighorn Council Transactions.

Bleich, V. C. 1994. Marvin Wood, 1909-1994. Wild Sheep 17(4):8.

Bleich, V. C. 1992. [Review of] Midnight wilderness: journeys in Alaska's Arctic National Wildlife Refuge, by D. S. Miller. California Fish and Game 78:85-86.

Bleich, V. C. 1992. [Review of] Natural history of the White-Inyo Range, eastern California, edited by C. A. Hall, Jr. California Fish and Game 78:84-85.

Bleich, V. C. 1987. James C. Bicket, 1947-1986. Wildlife Society Bulletin 15:477-478.

Bleich, V. C. 1987. J. D. "Don" Landells, 1926-1986. Western Section of The Wildlife Society Transactions 22:iv.

Bleich, V. C. 1987. James C. Bicket, 1947-1986. Western Section of The Wildlife Society Transactions 22:v.

Bleich, V. C. 1979. [Review of] Wild geese, by M. A. Ogilvie. California Fish and Game 66:282-283.

Bleich, V. C. 1977. [Review of] Mammals of the world, by E. P. Walker. California Fish and Game 63:73.

Bleich, V. C. 1975. [Review of] The carnivores, by R. F. Ewer. California Fish and Game

61:255-256.

Popular Articles:

Bleich, V. C. 2009. A brief history of the CDFG bighorn sheep habitat enhancement program. California Wild Sheep, Winter 2009:8-10.

Bleich, V. C. 2009. Some thoughts on "Water dispensaries keep mountain bighorn sheep alive. California Wild Sheep, Fall 2009:28-30.

Bleich, V. C. 2009. Parting shots [letter]. Bighorn (The Official Magazine of the Texas Bighorn Society), Spring 2009:30.

Bleich, V. C. 2009. Implications of fire history for conserving bighorn sheep. Boone and Crockett Club Trophy Points 3 (July 2009). Available at: http://www.boone-crockett.org/news/featured_story.asp?area=news&ID=52

Darby, N., J. Dungan, K. Stewart, **V. Bleich**, and D. Hughson. 2009. Responses of mule deer to experimental manipulation of water sources: preliminary results from the first year. Mojave National Preserve Science Newsletter 1:1-3.

Bleich, V. C., H. E. Johnson, S. A. Holl, L. Konde, S. G. Torres, and P. R. Krausman. 2009. Implications of fire history for conserving bighorn sheep. California Wild Sheep, Summer 2009:29.

Bleich, V. C. 2009. Some thoughts on water development in wilderness. California Wild Sheep, Spring 2009:8-9.

Bleich, V. C. 2008. Mountain sheep in California: some perspectives on the past, and prospects for the future (Part IV). California Wild Sheep, Fall 2008:14-15.

Bleich, V. C. 2008. Mountain sheep in California: some perspectives on the past, and prospects for the future (Part III). California Wild Sheep, Summer 2008:10-11.

Bleich, V. C. 2008. Mountain sheep in California: some perspectives on the past, and prospects for the future (Part II). California Wild Sheep, Spring 2008:12-13.

Bleich, V. C. 2007. Mountain sheep in California: some perspectives on the past and some prospects for the future (Part I). California Wild Sheep, Winter 2007:12-13.

Bleich, V. C. 2007. The Sierra Nevada bighorn sheep recovery program. Conservation Connection 16:11.

Bleich, V. C. 2007. The Sierra Nevada bighorn sheep recovery program. California Wild Sheep, Fall 2007:16-17.

Bleich, V. C., and B. M. Pierce. 2007. Management of mountain lions in California: history, basic biology, and citizen initiatives [part II]. Conservation Connection 15:12. Reprinted with permission from Records of North American Big Game, 12th Edition)

Monteith, K. L., and **V. C. Bleich**. 2007. Mule deer fawn survival in central Sierra Nevada. Outdoor California 6(3):26-29.

Bleich, V. C., and B. M. Pierce. 2007. Management of mountain lions in California: history, basic biology, and citizen initiatives [part II]. California Wild Sheep, Summer 2007:8-9. Reprinted with permission from Records of North American Big Game, 12th Edition)

Bleich, V. C., and B. M. Pierce. 2007. Management of mountain lions in California: history, basic biology, and citizen initiatives [part I]. Conservation Connection 14:18-19. Reprinted with permission from Records of North American Big Game, 12th Edition)

Bleich, V. C., and B. M. Pierce. 2007. Management of mountain lions in California: history, basic biology, and citizen initiatives [part I]. California Wild Sheep, Spring 2007:18-19. Reprinted with permission from Records of North American Big Game, 12th Edition)

Monteith, K. L., and **V. C. Bleich**. Mule deer fawn survival in the central Sierra Nevada. California Deer, Winter 2007:6-8.

Bleich, V. C. 2006. The potential for death at the waterhole. Conservation Connection 12:13. [Reprinted from California Wild Sheep, Fall 2006:8-9].

Monteith, K. L., and **V. C. Bleich**. 2006. Fawn survival: central Sierra Nevada. Mule Deer Foundation Magazine 9:16-18.

Bleich, V. C., and N. G. Andrew. 2006. Bighorn sheep in California: how many are there, and how are they doing? Foundation for North American Wild Sheep Conservation Connection 11:5-6. [Reprinted from California Wild Sheep, Summer 2006:4-5].

Bleich, V. C. 2006. The potential for death at the waterhole. California Wild Sheep, Fall 2006:8-9.

Bleich, V. C., and N. G. Andrew. 2006. Bighorn sheep in California: how many are there, and how are they doing? California Wild Sheep, Summer 2006:4-5.

Bleich, V. C. 2002. Restoring bighorn sheep to the Sierra Nevada: a project of interest to the Boone and Crockett Club. Fair Chase 17(1):22-26.

Bleich, V. C. 2001. Restoring bighorn sheep to the Sierra Nevada: a new challenge for wildlife biologists. Wild Sheep 24(4):47-50,52.

Bleich, V. C. 2001. Summer ranges, winter ranges, and migratory mule deer: putting the parts of a puzzle in place. Outdoor California 62(4):20-23.

Anderson, L. A., and **V. C. Bleich**. 2000. Desert bighorns in California: a success story for wildlife biologists and sheep hunters. Fair Chase 15(4):13-15.

Bleich, V. C., B. M. Pierce, S. G. Torres, and T. Lupo. 2000. Using space age technology to study mountain lion ecology. Outdoor California 61(3):24-25.

Torres, S. G., and **V. C. Bleich**. 2000. Mountain lions — California's elusive predator. Outdoor California 61(3):4-6.

Bleich, V. C., and N. G. Andrew. 2000. Mountain sheep, mule deer, and burros in the brush: flourishing wild burros impact habitats and native big game. Tracks 17:10-12.

Pauli, A. M., and **V. C. Bleich**. 1999. Gambel's quail hunting opportunities abundant within Mojave National Preserve. Pages 8-9,14 *in* A. J. Kenward, editor. Upland Game California. California Department of Fish and Game, Sacramento.

Bleich, V. C. 1999. Desert deer investigation launched. Outdoor California 60(5):13-15.

Bleich, V. C. 1999. [Letter] America's wilderness. National Geographic Magazine 195(3):xv.

Bleich, V. C. 1997. Securing large carnivores. Wildlife Control Technology 4(2):39.

Bleich, V. C. 1996. Assisting researchers can augment your income. Wildlife Control Technology 3(6):4.

Pierce, B. M., and **V. C. Bleich**. 1996. Round Valley deer study. Mule Deer 2(4):10-13.

Bleich, V. C. 1995. California's newest sheep hunting opportunity: the East Chocolate Mountains. Wild Sheep 18(4):19-22.

Pierce, B. M., and **V. C. Bleich**. 1995. California deer management: the Round Valley investigation. California Hunter Magazine 4(4):32-33.

Bleich, V. C., and S. G. Torres. 1995. The "book" rams are still out there. Tracks 12:9.

Bleich, V. C., and S. G. Torres. 1993. History and current status of mountain sheep in California. Wild Sheep 16(4):15-19.

Bleich, V. C. 1993. Sexual segregation in desert-dwelling mountain sheep. Wild Sheep 16(4):13-14.

Bleich, V. C. 1993. Mountain sheep habitat: using a geographic information system. Boone and Crockett Club News Journal 8(4):39-40.

Bleich, V. C. 1992. Round Valley deer facing long comeback trail. Tracks 9:9,15.

Bleich, V. C. 1990. Status of bighorn sheep in California: a brief synopsis. Wild Sheep

13(2):55.

Bleich, V. C. 1988. Distribution and early history of mountain sheep in California. Pages 1-3 *in* B. W. Wilson, editor. California desert bighorn sheep: a guidebook for the hunter. Society for the Conservation of Bighorn sheep, Los Angeles, California.

Bleich, V. C. 1988. Modern management of mountain sheep in California. Pages 4-6 *in* B. W. Wilson, editor. California desert bighorn sheep: a guidebook for the hunter. Society for the Conservation of Bighorn sheep, Los Angeles, California.

Bleich, V. C. 1983. Big game guzzlers and mountain sheep. Outdoor California 44(6):10.

Davis, J. H., and **V. C. Bleich**. 1980. Time-lapse photography: a new focus on wildlife. Outdoor California 41(4):7-9.

Coombes, L. J., and **V. C. Bleich**. 1979. Horizontal wells: the DFG's new slant on water for wildlife. Outdoor California 40(3):10-12.

Presentations at Professional Meetings

From 1972 to the present, I have been an author or coauthor of more than 100 presentations at professional meetings. I was selected to present the keynote address, "Ecology of mountain sheep: Ramifications for disease transmission and population persistence" at the April 2007 Workshop on Respiratory Disease in Mountain Sheep: Knowledge Gaps and Future Research held at the University of California, Davis. Details pertaining to these presentations are available upon request.

Grants and Fellowships

During 1973 - 2007, I competed successfully for and received project-specific funding in the amount of $1,636,247 from internal and external sources. Details of grants and other funding received are available upon request.

ATTACHMENT 301-A

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

REBUTTAL TESTIMONY OF VERNON C. BLEICH ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 15, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

2398-066a

I. Introduction

I have reviewed those documents that address evidence of mule deer and bighorn sheep on or near the property proposed for the development of the project known as the Blythe Solar Power Project ("Project") in eastern Riverside County. It is my opinion that the aforementioned documents have inadequately portrayed the potential importance of the location to two species of large mammals, bighorn sheep and mule deer, that occur in the area. Further, they have not addressed the impacts of the Project in the context of a potential effort to reestablish pronghorn in a geographic area that evidence indicates formerly was occupied by that species. My *curriculum vitae* is included with my opening testimony.

My rebuttal testimony the aforementioned documents, including the Applicant's opening testimony pertaining to mule deer and bighorn sheep, dated June 11, 2010.

II. The Lack of Detection of Nelson's Bighorn Sheep in the McCoy Mountains During Aerial Surveys for the Golden Eagle is Not Evidence of their Absence from the Project Impact Area

In opening testimony, the Applicant notes that the Revised Staff Assessment concluded that bighorn sheep are unlikely to use the Project Site or the McCoy Mountains, citing "... consultation with local experts and agency resource staff."[1] This conclusion is overstated, at best. Among factors contributing to visibility bias are group size (of the animals being surveyed),[2] type of terrain,[3] activity of the animals,[4] percent vegetative cover,[5] and survey intensity.[6] As explained in my opening testimony, bighorn sheep and other large mammals are difficult to see from the air, even by skilled and experienced observers conducting surveys focused exclusively on large ungulates.[7] Furthermore, a large proportion of animals available to be seen during any given survey is generally missed.[8] The fact that bighorn sheep were not detected in the McCoy Mountains during aerial surveys for the Golden Eagle is not evidence of absence,[9] particularly because the aforementioned aerial surveys were conducted to locate Golden Eagle aeries, and not specifically to search for bighorn sheep. Indeed, the Applicant states that, "PVSI conducted the eagle surveys as required by the agencies during the breeding season of 2010 to verify presence/absence within a 10-mile radius of the project and evaluate

---

[1] Palo Verde Solar I Opening Testimony, p. 34

[2] Bleich, V. C., C. S. Y. Chun, R. W. Anthes, T. E. Evans, and J. K. Fischer. 2001. Visibility bias and development of a sightability model for tule elk. Alces 37:315-327.

[3] Bodie, W. L., E. O. Garton, E. R. Taylor, and M. McCoy. 1995. A sightability model for bighorn sheep in canyon habitat. Journal of Wildlife Management 59:832-840.

[4] Bleich, V. C., C. S. Y. Chun, R. W. Anthes, T. E. Evans, and J. K. Fischer. 2001. Visibility bias and development of a sightability model for tule elk. Alces 37:315-327.

[5] Gasaway, W. C., S. D. DuBois, D. J. Reed, and S. J. Harbo. 1986. Estimating moose population parameters from aerial survey. Biological Papers of the University of Alaska 22:1-108.

[6] Wehausen, J. D., and V. C. Bleich. 2007. The effect of survey intensity on bighorn sheep helicopter counts. Desert Bighorn Council Transactions 49:23-29.

[7] Testimony of Vernon C. Bleich on Behalf Of California Unions for Reliable Energy for the Blythe Solar Power Project, June 11, 2010, p. 5.

[8] *Id.*

[9] *See* Palo Verde Solar I Opening Testimony, p. 34

potential eagle nesting foraging [*sic*] habitat."[10] Those flights were not focused bighorn sheep surveys; rather, observations of bighorn sheep were recorded opportunistically as they were encountered.[11]

Further, bighorn sheep aerial surveys normally are conducted during periods of sexual aggregation (i.e., summer and fall – not spring) when group sizes are larger than at other times of the year.[12] Group size and distribution are influenced by season[13, 14] because of the influence of rainfall on forage conditions in arid and highly variable environments[15] such as those near the Project site. Although the Applicant reportedly observed bighorn sheep "... in other desert mountain ranges further west..."[16] that result does not ensure that bighorn sheep were not present in the McCoy Mountains during the aforementioned survey. In my opinion, the fact that no bighorn sheep were observed in the McCoy Mountains during an aerial search for Golden Eagle aeries is not surprising, and cannot be considered evidence that bighorn sheep are absent from that range.

Mitigation for impacts is warranted and appropriate, for the reasons stated in my opening testimony, and given the likelihood that bighorn sheep inhabiting the mountains around Blythe range across a broad geographic area.[17] Bighorn sheep occupying extremely arid regions may be able to do so because they are able to move freely to travel widely in order to take advantage of seasonally available resources necessary to meet their life-history requirements.[18, 19] Indeed, bighorn sheep inhabiting other harsh and arid ecosystems, characteristics that aptly describe conditions in the vicinity of the proposed Project, have home ranges that averaged 22 square miles in size.[20] As I point out in my opening testimony, resources – including forage and water which are necessary for bighorn sheep to meet their life-history requirements – likely are more widely dispersed in eastern Riverside County where the proposed Project is located than on the western edge of Death Valley.[21] There, home ranges averaged 22 square miles in size.[22]

---

[10] Palo Verde Solar I Opening Testimony, p. 36

[11] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[12] Bleich, V. C., R. T. Bowyer, and J. D. Wehausen. 1997. Sexual segregation in mountain sheep: resources or predation. Wildlife Monographs 134:1-50.

[13] Bleich, V. C., R. T. Bowyer, and J. D. Wehausen. 1997. Sexual segregation in mountain sheep: resources or predation. Wildlife Monographs 134:1-50.

[14] Wehausen, J. D., and V. C. Bleich. 2007. The effect of survey intensity on bighorn sheep helicopter counts. Desert Bighorn Council Transactions 49:23-29.

[15] Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pp. 37-50 in J. Goerrissen and J. M. Andre, editors. Sweeney Granite Mountains Desert Research Center 1978-2003. A Quarter Century of Research and Teaching. University of California Natural Reserve System, Riverside, California, USA.

[16] Palo Verde Solar I Opening Testimony, p. 34

[17] *See* Testimony of Vernon C. Bleich on Behalf Of California Unions for Reliable Energy for the Blythe Solar Power Project, June 11, 2010, p. 12; *see also*

[18] G. W. Sudmeier, Society for the Conservation of Bighorn Sheep, personal communication on 1 June 2010.

[19] G. P. Mulcahy, California Department of Fish and Game, personal communication on 2 June 2010.

[20] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of female mountain sheep, *Ovis canadensis nelsoni*: effects of precipitation in a desert ecosystem. Mammalia 67:385-401.

[21] Testimony of Vernon C. Bleich on Behalf Of California Unions for Reliable Energy for the Blythe Solar Power Project, June 11, 2010, p. 12.

[22] Oehler, M. W., Sr., R. T. Bowyer, and V. C. Bleich. 2003. Home ranges of female mountain sheep, *Ovis canadensis nelsoni*: effects of precipitation in a desert ecosystem. Mammalia 67:385-401.

III. The Applicant Cites to No Support for the Contention that the Creation of a Water Source for the Nelson's Bighorn Sheep Would Adversely Impact the Species

Applicant states that, "in addition, addition of an artificial water source could likely have more significant adverse impacts. It would create dependency of a population of sheep on an artificial water source ...."[23] The Applicant attempts to lead the reader to believe that dependency of a population of sheep on an artificial water source is a bad thing, and would exacerbate any challenges with which bighorn sheep in the Project area are faced. Bighorn sheep are dependent upon water during the hottest times of the year[24] and water sources are commonly developed in efforts to conserve bighorn sheep.[25] The notion that bighorn sheep dependent on an artificial water source is somehow an onerous situation does not withstand scrutiny. Indeed, the Applicant cites to no facts to support its argument. Similarly, the argument that an artificial water source "...could affect population dynamics in an unnatural way"[26] is spurious and without support. What is not spurious, however, is the fact that bighorn sheep inhabiting "... the mountains around Blythe"[27] will be impacted by development of the proposed Project.

IV. Prior Studies Show that Raven Populations Occur Only Infrequently at Wildlife Water Developments

The Applicant also asserts that mitigation in the form of water development will create "... a potential new subsidy for ravens that could negatively affect desert tortoise by increasing this predatory species."[28] Raven populations are strongly influenced by, and associated with, development of roads and linear rights of way, urbanization, and agriculture.[29, 30, 31] There is a positive linear relationship between density of rights of way and raven populations, and road density and the type of road likely influence raven density.[32] Major highways have a strong influence on distribution of ravens because there is more traffic and more carrion along major highways than on secondary roads.[33] The positive relationship between raven density and major highways, transmission lines, and linear facilities likely exists because roads, transmission lines, power lines, and railroads provide sources of food, grit, and locations for nesting and perching.[34,

---

[23] Palo Verde Solar I Opening Testimony, p. 34

[24] Turner, J. C. 1973. Water, energy and electrolyte balance in the desert bighorn sheep, *Ovis canadensis*. Ph.D. Thesis, Univ. California, Riverside.

[25] Dolan, B. F. 2006. Water developments and desert bighorn sheep: implications for conservation. Wildlife Society Bulletin 34:642-646.

[26] Palo Verde Solar I Opening Testimony, p. 34

[27] Response to CEC Staff Data Request, Biological Resources AFC Section 5.3, p. BIO-50.

[28] Palo Verde Solar I Opening Testimony, p. 34

[29] Knight, R. L., R. J. Camp, W. I. Boarman, and H. A. L. Knight. 1999. Predatory bird populations in the east Mohave Desert, California. Great Basin Naturalist 59:331-338.

[30] Knight, R. L., H. A. L. Knight, and R. J. Camp. 1993. Raven populations and land use patterns in the Mojave Desert, California. Wildlife Society Bulletin 21:469-471.

[31] Kristan, W. B., and W. I. Boarman. 2002. Spatial pattern of risk of common raven predation on desert tortoises. Ecology 84:2432-2443.

[32] Knight, R. L., R. J. Camp, W. I. Boarman, and H. A. L. Knight. 1999. Raven populations and land use patterns in the Mojave Desert. Great Basin Naturalist 59:331-338.

[33] Austin, G. T. 1971. Roadside distribution of the common raven in the Mojave Desert. California Birds 2:98.

[34] Boarman, W. I., M. A. Pattten, R. J. Camp, and S. J. Collis. 2006. Ecology of a population of subsidized predators: common ravens in the central Mojave Desert. Journal of Arid Environments 67:248-261.

[35, 36] The development of a water source does not require the construction of a transmission line, or even a road. Such sites would be visited by trained personnel approximately twice annually for maintenance purposes.[37] Consistent with this, ravens have been documented to occur only infrequently at wildlife water developments in the Sonoran Desert (a total of 270 visits by ravens in nearly 38,000 hours of observation).[38] Therefore, the Applicant's supposition that the development of a wildlife water source in the McCoy Mountains would increase predation upon desert tortoises by raven populations is unfounded and should be rejected.

---

[35] Knight, R. L., H. A. L. Knight, and R. J. Camp. 1993. Raven populations and land use patterns in the Mojave Desert, California. Wildlife Society Bulletin 21:469-471.

[36] Knight, R. L., R. J. Camp, W. I. Boarman, and H. A. L. Knight. 1999. Predatory bird populations in the east Mohave Desert, California. Great Basin Naturalist 59:331-338.

[37] Bleich, V. C., and A. M. Pauli. 1990. Mechanical evaluation of artidicial water devices built for mountain sheep in California. Pp. 65-72 *in* G. K. Tsukamoto and S. J. Stiver, editors. Wildlife water development. The Wildlife Society, U.S. Bureau of Land Management, and Nevada Department of Wildlife, Reno, Nevada.

[38] O'Brien, C. S., R. B. Waddell, S. S. Rosenstock, and M. J. Rabe. 2006. Wildlife use of water catchments in southwestern Arizona. Wildlife Society Bulletin 34:582-591.

DECLARATION OF VERNON C. BLEICH
BLYTHE SOLAR POWER PROJECT
09-AFC-6

I, Vernon C. Bleich, declare as follows:

1. I recently retired from the California Department of Fish and Game, where I worked extensively and primarily with large mammals in the arid ecosystems that characterize eastern and southeastern California. As a private citizen, I currently offer expertise with respect to natural resource conservation issues.

2. I hold an M.A. degree in biology and a Ph.D. in wildlife biology. My relevant professional qualifications and experience are set forth in the attached curriculum vitae and the attached testimony, and are incorporated herein by reference.

3. I prepared the testimony attached hereto and incorporated herein by reference as it relates to the Staff Assessment/Draft Environmental Impact Statement prepared for the project known as the Blythe Solar Power Project in Riverside County.

4. It is my professional opinion that the attached testimony is true and accurate.

5. I am personally familiar with the facts and conclusions described within the attached testimony and if called as a witness, I could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Executed on June 15, 2010, at Bishop, CA

Vernon C. Bleich

2398-046a

EXHIBIT 302

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

TESTIMONY OF SCOTT CASHEN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 11, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

I. INTRODUCTION

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Blythe Solar Power Project ("Project" or "BSPP") since the data adequacy phase. I have reviewed numerous documents and have conducted my own investigations and analyses regarding the Project's potential environmental impacts and alternatives.

I have a Master's of Science Degree in Wildlife and Fisheries Science from the Pennsylvania State University, University Park. The degree program included coursework in Landscape Ecology, Biometrics, Statistics, Conservation Biology, and Wetland Ecology. For my thesis, I conducted seven seasons of independent research on avian use of restored wetlands. The U.S. Fish and Wildlife Service subsequently used my technical report as a model for other habitat restoration monitoring projects in Pennsylvania.

My employment experience has included work in the fields of wildlife biology, forestry, and natural resource consulting. Much of my work over the past two and a half years has involved review of environmental documents associated with development of large-scale solar energy facilities. To date, I have served as an expert on 12 different solar projects, 9 of which are being sited in the Mojave or Sonoran Desert. I am currently concluding a two-year contract I hold with the State of California to conduct surveys for the Peninsular bighorn sheep near Anza-Borrego Desert State Park. I serve as a member of the scientific review team responsible for assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.

For the past two and a half years I have operated my own consulting business. I previously served as a Senior Biologist for TSS Consultants and ECORP Consulting. Other positions I have held have included conducting wildlife research for the National Park Service, the Point Reyes Bird Observatory, and the University of California. While in graduate school I served as an instructor of Wildlife Management and as a teaching assistant for a course on ornithology. A summary of my education and professional experience is attached to this testimony as Attachment 1.

My testimony is based on the activities described above and the knowledge and experience I have acquired during more than 18 years of working in the field of natural resources management.

II. THE PROJECT MAY RESULT IN UNMITIGATED SIGNIFICANT IMPACTS TO GILA WOODPECKERS

The Gila woodpecker (*Melanerpes uropygialis*) is listed as endangered under the California Endangered Species Act. Staff has concluded that this woodpecker is not expected on the Project site because (a) it is outside of the Gila woodpecker range; (b) it does not contain suitable nesting habitat; (c) the Project site is at a distance from known occurrences of the species; and (d) the Applicant contends that this highly conspicuous species likely would have been detected during point count surveys.[1] A review of literature and documentation provided by the Applicant strongly suggests that these reasons are neither entirely accurate, nor sufficient to conclude that the Gila woodpecker does not occur on the Project site.

A. The Revised Staff Assessment Does Not Accurately Report the Range of the Gila Woodpecker

The Revised Staff Assessment states Gila woodpeckers formerly occurred in desert washes up to one mile from the Colorado River, and that they are currently limited to riparian areas along the Colorado River.[2] Staff has not cited the source of this information. However, based on the verbiage, Staff's information appears to have been derived from either the 1987 petition to list the species,[3] or the 2002 NECO Plan.[4] While technically correct at the time the documents were published, the information presented in these sources is now outdated. Since the documents were published researchers have discovered small populations of Gila woodpeckers in Palo Verde–Ironwood woodlands west of the Colorado River.[5, 6] Based on my review of recent scientific literature, Gila woodpeckers are known to occur in mature xeric riparian woodlands, just like those that occur in the Project area. Gila woodpeckers have been documented as occurring at several locations west of the Colorado River. These locations are documented in the California Natural Diversity

---

[1] Revised Staff Assessment of Blythe Solar Power Project. Biological Resources. June 2010. P. C.2-46; Attachment A to Appendix A, p. A-13.
[2] Revised Staff Assessment, p. C.2-46.
[3] Larsen CJ. 1987. Petition to the State of California Fish and Game Commission. http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentVersionID=3356.
[4] BLM and CDFG. 2002. Final Environmental Impact Statement. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan. Bureau of Land Management, California Desert, Riverside, CA. p. 2-2.
[5] California Partners in Flight. 2009. Version 1.0. The Desert Bird Conservation Plan: a Strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California Partners in Flight. Available at: http://www.prbo.org/calpif/plans.html.
[6] California Natural Diversity Database. 2009. Rarefind [computer program]. Version 3.1.0. Mar 2, 2010. Sacramento (CA): Wildlife & Habitat Data Analysis Branch. California Department of Fish and Game.

Database ("CNDDB"), [7] illustrated in Figure 1, and attached hereto as Attachment 2, and in the Desert Bird Conservation Plan published by California Partners in Flight and Point Reyes Bird Observatory, [8] illustrated in Figure 2 and attached hereto as Attachment 3.

B. The Revised Staff Assessment Does Not Accurately Report Nesting Habitat for Gila Woodpeckers

The Revised Staff Assessment relies on the Applicant's documents to conclude that the Project area does not contain suitable habitat for the Gila woodpecker. However, there is nothing to indicate that Staff conducted an independent evaluation of the validity of the Applicant's conclusion. Several studies and surveys have documented Gila woodpeckers breeding in dry desert wash woodlands such as those that occur in the Project area. Grinnell and Miller (1944) reported Gila woodpecker habitat as: "[m]ainly riparian cottonwoods and willows, of old growth; but also up *desert washes where ironwood and palo verde reach large size.* Availability of diggable tree-trunks for nesting seems to be primary factor for presence; a favoring one is *presence of berry-bearing mistletoe as parasitic especially on mesquite.*"[9] The conditions reported by Grinnell and Miller (1944) appear to be present in the Project area. In its Streambed Alteration Agreement application, the Applicant referred to the Dry Desert Wash Woodland as "mature,"[10] and reported "[w]ithin the survey area the extensive portions of the established washes are occupied by a *relatively large desert dry wash woodland vegetation community.* Blue palo verde, smoke tree, and ironwood are the dominant overstory and indicator plants of the desert dry wash woodland community. Desert dry wash woodland obligate plants composing the understory are desert starvine, desert lavender, big galleta grass, and honey mesquite."[11] Mistletoe, the favoring factor referenced by Grinnell and Miller, is present in the Project area.[12]

Anderson et al. (1982) observed Gila woodpecker nests in honey mesquite trees along the lower Colorado River.[13] McCreedy et al. (2006) surveyed Milpitas Wash in Imperial County and reported every Gila woodpecker nest they detected

---

[7] California Natural Diversity Database. 2009. Rarefind [computer program]. Version 3.1.0. Mar 2, 2010. Sacramento (CA): Wildlife & Habitat Data Analysis Branch. California Department of Fish and Game.

[8] CalPIF (California Partners in Flight). 2009. Version 1.0. The Desert Bird Conservation Plan: a Strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California Partners in Flight. http://www.prbo.org/calpif/plans.html.

[9] Grinnell J, AH Miller. 1944. The distribution of the birds of California. Pac. Coast Avifauna No. 27. 608pp. [emphasis added].

[10] Attachment H to Applicant's Streambed Alteration Agreement application, 25 Nov 2009. p. 9.

[11] Applicant's Streambed Alteration Agreement application, 25 Nov 2009. p. 44. [emphasis added].

[12] AFC, Appendix F. (EDAW AECOM. 2009 Aug. Biological Technical Report: Blythe Solar Power Project: Riverside County, CA). Attachment 2: Floral Species Observed. p. 2-4.

[13] Anderson et al. 1982. Evidence for social regulation in some riparian bird populations. American Naturalist. 120:340-352.

occurred in blue palo verdes.[14] The Desert Bird Conservation Plan, a joint effort between California Partners in Flight and Point Reyes Bird Observatory, states that the presence of blue palo verde has been found to positively influence presence and abundance of the Gila woodpecker.[15] Honey mesquite and blue palo verde are relatively abundant within the dry desert wash woodlands in the Project area.

According to the California Natural Diversity Database, 9 of the 34 (26%) documented occurrences of Gila woodpeckers within the State of California are associated with vegetation communities similar to those present on the Project site (Reproduced on the following page in Table 1).[16]

---

[14] McCreedy, C., C. Howell, and L. Culp. 2006. Xeric Riparian Songbird Project: 2004 progress report. PRBO Conservation Science, 4990 Shoreline Highway, Stinson Beach, CA, 94970. PRBO Contribution No. 1309.

[15] The Desert Bird Conservation Plan: A Strategy for Protecting and Managing Desert Habitats and Associated Birds in the Mojave and Colorado Deserts. 2009. Version 1.0. California Partners in Flight and Point Reyes Bird Observatory Conservation Science. Table 8-2. p.70.

[16] California Natural Diversity Database. 2009. Rarefind [computer program]. Version 3.1.0. Mar 2, 2010. Sacramento (CA): Wildlife & Habitat Data Analysis Branch. California Department of Fish and Game.

Table 1. CNDDB records of Gila woodpecker occurrences in habitat comparable to habitat on the Project site.

Record	Ecological community
24	HABITAT CONSISTS OF SALT CEDAR, MESQUITE, AND PALO VERDE WITH A QUAIL BRUSH UNDERSTORY; GOOD HABITAT EXCEPT FOR THE PRESENCE OF SALT CEDAR.
25	HABITAT CONSISTS OF PALO VERDE, MESQUITE, AND SALT CEDAR. OPEN AREAS ARE CREOSOTE GROUND COVER.
28	HABITAT IS PALO VERDE, SALT CEDAR, AND MESQUITE; MANY TRAILER PARKS AND SOME ORV USE IN THE AREA, OTHERWISE GOOD HABITAT.
30	DESERT WASH WOODLAND WITH PALO VERDE & IRONWOOD SURROUNDED BY DISTURBED CREOSOTE BUSH SCRUB.
31	DESERT WASH SCRUB WITH PALO VERDE AND IRONWOOD
32	DESERT WASH SCRUB WITH PALO VERDE AND IRONWOOD SURROUNDED BY CREOSOTE BUSH SCRUB.
33	DESERT WASH WOODLAND WITH PALO VERDE, IRONWOOD, CREOSOTE BUSH AND MESQUITE.
34	BRAIDED WASH WITH OLNEYA TESOSA, CERCIDIUM MICROPHYLLA, & LARREA TRIDENTATA
35	MICROPHYLL WOODLAND DOMINATED BY PALO VERDE, CREOSOTE AND IRONWOOD. AREA USED FOR OHV RECREATION AND CAMPING.

To date, the Applicant has detected at least five woodpecker nest cavities within the Biological Resources Study Area.[17, 18] According to the Applicant: "[i]t was not confirmed what woodpecker species uses these nest cavities."[19] Additionally, during reconnaissance level surveys for bats, Project biologists observed tree cavities that, after closer inspection, were determined to probably be woodpecker cavities.[20]

Staff suggests that there is a low potential for occurrence of the Gila woodpecker due to the Project's distance from the nearest CNDDB record (which is along the Colorado River).[21] Staff's reasoning is not justifiable and lacks basis for the following reasons. First, the CNDDB is a positive sighting database. As a result, a lack of records in the CNDDB cannot be used to conclude an animal does not occur in a given area. Second, isolated populations of Gila woodpeckers have been reported at distant, disconnected locations, such as Griffith Park in Los Angeles among other locations.[22] This information indicates that Gila woodpeckers will disperse to, and colonize, suitable habitat disjunct from the Colorado River. The Project site, which is only 13 miles from the Colorado River, is well within the dispersal distance of known Gila woodpecker populations. Third, the Gila woodpecker has been documented at several locations south of the I-10, which are as far and further west from the Colorado River than the Project site.[23] Fourth, Staff's conclusion that the Gila woodpecker is absent from the Project area, despite possible evidence to the contrary (i.e., presence of woodpecker cavities), appears to be largely due to an absence of prior survey efforts rather than a lack of habitat. According to the 2009 Desert Bird Conservation Plan, Milpitas Wash (Imperial County) is the only xeric riparian habitat that has been specifically surveyed for Gila woodpeckers. Information associated with the CNDDB occurrence records south of I-10 (e.g., several unique detections made on the same date), and the proximity of Gila woodpecker occurrences to Highway 78, suggest the records were obtained as part of a survey route or other focused effort.

---

[17] Streambed Alteration Agreement Application, November 25, 2009, Blythe Solar Power Project Biological Resources Technical Report. p. 68.

[18] AECOM. 2010 May 14. Preliminary Spring 2010 Survey Results: Corrected and Preliminary Impact Calculations for Biological Resources. Letter report to Susan Sanders, California Energy Commission.

[19] Streambed Alteration Agreement Application, November 25, 2009, Blythe Solar Power Project Biological Resources Technical Report. p. 68.

[20] Applicant's Responses to CEC Data Requests Set 1, January 6, 2010, Response to DR-BIO-45-97 and Response to DR-BIO-52.

[21] Revised Staff Assessment, p. C.2-46.

[22] Edwards, Holly H. and Gary D. Schnell. 2000. Gila Woodpecker (Melanerpes uropygialis), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/532 doi:10.2173/bna.532

[23] See Figure 1.

Although the Project site is slightly further north of the core of the species' range, there is nothing to suggest that the same pattern of distribution does not occur north of I-10 as occurs south of I-10.

The Revised Staff Assessment also states Gila woodpeckers are conspicuous, and likely would have been detected during the Applicant's point count surveys.[24] It is unclear whether Staff has adopted this conclusion, or is simply relaying the Applicant's sentiment.[25] Regardless, it is a scientifically indefensible argument. Survey methods, observers, training of observers (or lack of training), species, habitats, and other environmental variables all affect bird detection probability. Even for conspicuous species, it is very common for animals and even entire species to be missed and go undetected.[26] This factor alone undermines the validity of the argument that Gila woodpeckers likely would have been detected. Its validity is further reduced by the fact that bird surveys were not conducted in much of the dry desert wash woodland habitat within the Project area.[27] Equally damaging to Staff's conclusion is the fact that the Applicant conducted no focused surveys for the Gila woodpecker,[28] and has to date been "unable" to identify the particular species associated with any of the several woodpecker cavities that were detected in the Project area.

The Project would result in impacts to at least 269 acres of Desert Wash Woodland that contains plant species associated with occurrence of Gila woodpeckers.[29] Based on this information, as well as information provided by scientific literature and the Applicant's survey reports, it is my professional opinion that the Project site provides habitat for the Gila woodpecker, and that the species has the potential to occur on the Project site. Without appropriate mitigation, the Project would cause a potentially significant, unmitigated impact to the species and its habitat.

---

[24] Revised Staff Assessment of Blythe Solar Power Project. Biological Resources. June 2010. Attachment A to Appendix A, p. A-13.

[25] A footnote associated with the statement indicates it was taken from the EDAW AECOM Biological Technical Report for the Project Site. See Revised Staff Assessment, p. A-18.

[26] MacKenzie DI, JD Nichols, JA Royle, KH Pollock, LL Bailey, JE Hines. 2006. Occupancy estimation and modeling: inferring patterns and dynamics of species occurrence. Boston (MA): Elsevier.

[27] AFC, Attachment H to Appendix F, Figure 3.

[28] AFC, Biological Resources Technical Report, p. 68.

[29] Revised Staff Assessment, p. C.2-57. According to the Applicant, the Applicant will submit a jurisdictional delineation report that will include the Project's linear features in June.

III. THE REVISED STAFF ASSESSMENT DOES NOT PROVIDE ADEQUATE BASELINE INFORMATION OR MITIGATION MEASURES FOR THE COUCH'S SPADEFOOT TOAD

The Project site contains suitable breeding, foraging, and refuge habitat for Couch's spadefoot toad. The Staff Assessment/Draft Environmental Impact Statement ("SA/DEIS") prepared for the Project concluded: (a) "because the surveys were not conducted during the proper season (i.e., after summer rains), the [Applicant's] lack of observations does not suggest the species is absent from the Project site."[30]; and (b) "[w]ithout survey results it is difficult to assess the potential for direct and indirect impacts to this species."[31]

Since the issuance of the SA/DEIS, the Applicant has submitted preliminary results of Spring 2010 surveys, which confirm the species' potential presence on the Project site. However, the critical limitations previously identified by Staff still have not been resolved. Specifically, appropriately timed surveys have not been conducted, and therefore an accurate impact assessment cannot be developed. As a result, I agree with Staff's conclusion that the Project could have adverse impacts on Couch's spadefoot toads, although there is insufficient information to evaluate the magnitude and extent of the impacts. Without adequate baseline data, there is no scientific basis to conclude that Staff's proposed mitigation would reduce Project impacts to less than significant levels. I reserve the right to submit supplemental testimony on this topic after the Applicant has provided the information necessary to evaluate existing conditions, Project impacts, and mitigation measures for the Couch's spadefoot toad.

A. The Applicant Has Not Provided Information Necessary to Determine Baseline and the Full Range of Project Impacts

The Applicant reported that the soils on the Project site have high infiltration rates and a low potential for surface ponding, and that the Applicant's consultant did not observe evidence of seasonal ponding during surveys conducted in 2009.[32] Based on the foregoing, the Applicant initially concluded that Couch's spadefoot toad is not expected within the disturbance area.[33] However, the Applicant additionally reported that ponding of water "may have a potential to occur" where service road crossings go over channels or swales within the Project area.[34]

---

[30] SA/DEIS, p. C.2-30.
[31] SA/DEIS, p. C.2-64.
[32] Applicant's responses to CEC Email Query, January 28, 2010.
[33] Id.
[34] Id.

According to the Applicant, the Sonoran Creosote Bush Scrub community in the Project area is characterized by sandy soils with a shallow clay pan, and caliche burrows (a cavity eroded or excavated into hard calcium carbonate soils).[35, 36] Clay pans are defined as a clay layer in the soil that restricts downward movement of water and growth of roots.[37] These conditions would appear to promote the ponding of water. However, neither the Applicant nor Staff has provided an explanation for why the shallow clay pans or caliche burrows would not support Couch's spadefoot toad breeding ponds.

CURE prepared several data requests in an attempt to resolve this issue, but to date the Applicant has not provided responses to those requests. The Applicant has, however, recently provided "preliminary" data to Energy Commission Staff that indicates Couch's spadefoot toads may occur in the Project area. In its preliminary results of biological surveys conducted in spring 2010 for desert tortoise, rare plants, jurisdictional waters, and incidental wildlife occurrences, the Applicant indicated multiple potential spadefoot toad breeding pond sites occur within the Project area.[38] However, the Applicant has yet to provide any information on the methods that were used to identify potential breeding ponds;[39] their characteristics (e.g., size, substrate, proximity to other habitat elements); or a Project impact analysis with regard to this species and its habitat. This information is necessary to make inferences on the Project's impact to the regional spadefoot toad population, and to devise effective mitigation strategies.

B. The Revised Staff Assessment Does Not Ensure Mitigation of Project Impacts to the Couch's Spadefoot Toad

Whereas mitigation for impacts to Couch's spadefoot toad is appropriate, the measures proposed by Staff must be revised to ensure that they achieve their intended purpose. Condition of Certification BIO-26 ("BIO-26") in the Revised Staff Assessment requires the Applicant to create "additional breeding habitats (ephemeral pond) at least equal in area to the acreage of ponds being impacted" if the Applicant is unable to avoid the Couch's spadefoot toad ponds identified during surveys.[40] BIO-26 does not ensure mitigation of Project impacts to Couch's spadefoot toad for the following reasons.

---

[35] AFC, p. 5.3-30

[36] AFC, p. 5.3-16.

[37] Webster's New World College Dictionary Copyright © 2009 by Wiley Publishing, Inc., Cleveland, Ohio.

[38] Revised Staff Assessment, p. C.2-32.

[39] Although, the title of the Applicant's document suggests they were not a focused of the surveys.

[40] Revised Staff Assessment of Blythe Solar Power Project. Biological Resources. June 2010. BIO-26. p. C.2-217.

1. BIO-26 Does Not Meet the Habitat Requirements of the Couch's Spadefoot Toad

Couch's spadefoot toads have three principal habitat requirements. These are:

1. Temporary desert rainpools with water temperatures >15 °C in which to breed. The breeding pool must last for at least seven days for metamorphosis to occur.
2. Subterranean refuge sites (with a loose enough substrate to permit burial) must occur in the vicinity of the breeding pool; and
3. An insect food base (that probably includes alate termites) and primary production that sustains the food base. [41]

The mitigation proposed in the Revised Staff Assessment addresses only *one* of these habitat requirements, and provides *no assurance* that this single habitat requirement will be met. Specifically, the only habitat requirement addressed by Staff's proposed mitigation is the need for the Applicant to create ponds capable of holding water for at least nine days during the spadefoot toad breeding season. Furthermore, the "breeding season" has been only loosely defined, and criteria for establishing it need to be established in Staff's mitigation. Because BIO-26 does not require the created ponds to have water temperatures >15 °C, there is no assurance they will serve as suitable breeding sites.

Staff's proposed mitigation has no provision for subterranean refuge sites or a sustainable food base—the other two habitat requirements for Couch's spadefoot toads. These criteria must also be incorporated into BIO-26. Furthermore, the proposed mitigation lacks any discussion of where created ponds would be located, how they would be conserved in perpetuity, a funding mechanism for their preservation and management, and the water supply for meeting Staff's condition that they hold water for a minimum of nine days.

2. Performance Criteria Central to Reserve Design Are Not Incorporated into the Mitigation Scheme

The Revised Staff Assessment suggests water quality and noise disturbance may negatively affect Couch's spadefoot toad breeding activities. BIO-26 does not require the Applicant to meet any minimum standards associated with these potentially influential variables. In addition, BIO-26 does not establish performance criteria for any of the issues (or considerations) central to reserve

[41] Jennings MR, MP Hayes. 1994. Amphibian and reptile species of special concern in California. Rancho Cordova, CA: California Dept. of Fish and Game, Inland Fisheries Division.

design. These include site selection, corridors, buffers, isolation, and fragmentation.[42]

3. Mitigation Does Not Impose Limits on Patch Size

Scientists that developed the California Wildlife Habitat Relationship model considered patch size to be an important consideration in habitat suitability for Couch's spadefoot toads.[43] In particular, once a certain patch size is reached, area alone does not increase habitat suitability. This is especially important because Staff's proposed mitigation does not require the Applicant to replicate the distribution and number of pools impacted by the Project, only the acres that are impacted (e.g., the Applicant could create one "mega" pool to replace impacts to 10 well-distributed pools). These two variables affect overall habitat suitability for Couch's spadefoot toads, and they need to be incorporated into Staff's mitigation.

4. Potentially Significant Adverse Impacts of BIO-26

The Revised Staff Assessment suggests the proposed mitigation may require ground disturbance (for example, soil compaction).[44] However, it does not appear to require an environmental impact analysis for the associated ground disturbance activities, habitat conversion, or water use (if an artificial water source is used). At a minimum, these elements of BIO-26 must be evaluated to ascertain whether there are any potentially adverse impacts stemming from Staff's proposed mitigation.

5. Monitoring Requirements

A management approach (e.g., creation of spadefoot toad breeding ponds) that is unsubstantiated by research is, in essence, a management experiment. Therefore, in the absence of empirical information, it cannot be relied on as a management solution. A rigorous monitoring program with built-in adaptive management measures is almost always necessary to achieve the desired outcome.[45] However, the monitoring program established by the Revised Staff Assessment lacks rigorous monitoring or adaptive management. In particular, the appropriate parameters for monitoring should correspond with the goal(s) of the management action. In this case, Staff's goal is to mitigate Project impacts to Couch's spadefoot toads and their breeding habitat by creating substitute breeding habitat if

---

[42] Morrison ML. 2002. Wildlife restoration: techniques for habitat analysis and animal monitoring. Washington (DC): Island Press.

[43] Laudenslayer WF Jr, California Department of Fish and Game. 2007. Species Notes for Couch's Spadefoot (*Scaphiopus couchii*): California Wildlife Habitat Relationships (CWHR) System Level II Model Prototype. Available at: nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=7135

[44] Revised Staff Assessment, p. C.2-217.

[45] Morrison ML. 2002. Wildlife restoration: techniques for habitat analysis and animal monitoring. Washington (DC): Island Press.

avoidance is not possible. However, the only established monitoring requirement is to ensure created ponds hold water for at least nine days during the spadefoot toad breeding season. The difference is subtle but extremely significant: the goal is to create substitute breeding habitat *not* to create a pond that holds water for nine days (i.e., not all ponds that hold water for nine days provide breeding habitat). Therefore, Staff must incorporate monitoring that confirms spadefoot toads are breeding in any pond habitat that is created as mitigation.

IV. THE PROJECT MAY RESULT IN UNMITIGATED SIGNIFICANT IMPACTS TO COACHELLA VALLEY MILKVETCH

Coachella Valley milk-vetch is a federally listed endangered species. In the preliminary results of its Spring 2010 surveys, the Applicant reported 14 populations of Coachella Valley milk-vetch within the Project buffer.[46] One week later, the Applicant submitted "revised" results that indicated Coachella Valley milk-vetch had been misidentified and was not present in the Project area.[47] The Applicant's revision is confusing, particularly because (a) Project biologists had visited a reference population of Coachella Valley milk-vetch prior to the surveys;[48] and (b) the Applicant has not provided any scientific (or other) basis to explain how 14 distinct populations could have been misidentified. The Revised Staff Assessment does not address the discrepancy in the Applicant's preliminary survey results. However, the Revised Staff Assessment does require additional surveys to be conducted by crew members that first visit reference sites and/or review herbarium specimens to obtain a search image of Coachella Valley milk-vetch.[49] As neither the Applicant nor Staff have provided reliable data negating the potential for the Coachella Valley milk-vetch to be present on the Project site and to be impacted by the Project, I reserve the right to supplement my testimony on this topic.

V. ADDITIONAL DATA NECESSARY TO ESTABLISH A COMPENSATORY MITIGATION PLAN

The Revised Staff Assessment requires the Applicant to acquire compensation land in order to offset some of the Project's potentially significant impacts to biological resources.[50] However, Staff cannot conclude Project impacts would be fully mitigated by compensatory mitigation until details of the

---

[46] AECOM. 2010 May 7. Blythe Solar Power Project (09-AFC-6) – Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants and Jurisdictional Waters. Letter from Bill Graham to Susan Sanders.

[47] AECOM. 2010 May 14. Blythe Solar Power Project (09-AFC-6) – Preliminary Spring 2010 Survey Results Corrected and Preliminary Impact Calculations for Biological Resources. Letter from Bill Graham to Susan Sanders.

[48] AFC, p. 5.3-18.

[49] Revised Staff Assessment, p. C.2-196.

[50] Revised Staff Assessment, pp. 2.2-181-2-212.

compensation plan have been provided by the Applicant. Such details would, at a minimum, include: the location and environmental qualities associated with the proposed compensation lands; an evaluation of the degree of disturbance, dumping, and historical structures (among other factors) that may require cleaning, fencing, repair, or demolition; the timeframe associated with the aforementioned work (if required) and whether additional lands or monies will be required to off-set the aforementioned impediments; and an evaluation of the threats and limiting factors at the compensation lands, including a discussion of how the threats and limiting factors affect desert tortoise populations and other sensitive biological resources for which the compensation lands are intended.[51]

A monitoring and adaptive management process is necessary to ensure compensation lands fully mitigate Project impacts. The Revised Staff Assessment lacks criteria or an enforcement mechanism for this process. To ensure Project impacts are fully mitigated, expectations for long-term monitoring of compensation lands must be incorporated into the impact mitigation plan, including expectations for the establishment of success criteria and triggers for implementing adaptive management. These expectations should incorporate a timeframe appropriate to the desert ecosystem, baseline and desired conditions of the acquisition site, and the increases in relative abundance that will result from habitat enhancement.

Lastly, desert habitat enhancement costs can be expensive.[52] The cost of comprehensive rehabilitation may exceed $10,000 per acre. In 1999, "modest" rehabilitation techniques implemented to expedite natural recovery reportedly cost $500 to $2,000 an acre.[53] These costs suggest that few habitat enhancement (or protection) measures can be accomplished with staff's required funding of $330/a

---

[51] *See, e.g.*, Memorandum from Heather Blair, Energy Commission Staff Biologist (Aspen Environmental Group) to Craig Hoffman, Energy Commission Project Manager, February 5, 2010 regarding Abengoa Mojave Solar – Project time-sensitive issues and informational needs, attached hereto as Attachment 4.

[52] *See* Hailey J, and D Bainbridge. 1999. Desert Restoration: Do something or wait a thousand years? [abstract] Mojave Desert Science Symposium; 1999 Feb 25-27, Las Vegas. USGS, Western Ecological Research Center [internet]. Available from: http://www.werc.usgs.gov/mojave-symposium/ .

[53] *Id.*

Declaration of Scott Cashen
Blythe Solar Power Project

Docket 09-AFC-6

I, Scott Cashen, declare as follows:

1) I am an independent biological resources consultant. I have been operating my own consulting business for the past three years. Prior to starting my own business I was the Senior Biologist for TSS Consultants.

2) I hold a Master's degree in Wildlife and Fisheries Science. My relevant professional qualifications and experience are set forth in the attached testimony and are incorporated herein by reference.

3) I prepared the testimony attached hereto and incorporated herein by reference, relating to the biological resource impacts of the Blythe Solar Power Project.

5) It is my professional opinion that the attached testimony and maps contained therein are true and accurate with respect to the issues that they address.

6) I am personally familiar with the facts and conclusions described within the attached testimony and maps, and if called as a witness, I could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6-10-10 Signed: _____

At: Walnut Creek, CA

EXHIBIT 303

ATTACHMENT 1

Scott Cashen, M.S.
Senior Biologist / Forest Ecologist
3264 Hudson Avenue, Walnut Creek, CA 94597. (925) 256-9185. scottcashen@gmail.com

In his 17 years in the profession, Scott Cashen has consulted on projects pertaining to wildlife and fisheries ecology, avian biology, wetland restoration, and forest management. Because of his varied experience, Mr. Cashen is knowledgeable of the link between the various disciplines of natural resource management, and he is a versatile scientist.

Mr. Cashen's employment experience includes work as an expert witness, wildlife biologist, consulting forester, and instructor of Wildlife Management. He has worked throughout California, and he is knowledgeable of the different terrestrial and aquatic species and habitats present in the state.

Mr. Cashen is an accomplished birder and is able to identify bird species by sight and sound. His knowledge has enabled him to survey birds throughout the United States and instruct others on avian identification. Mr. Cashen's research on avian use of restored wetlands is currently being used by the United States Fish and Wildlife Service to design wetlands for specific "target" species, and as a model for other restored wildlife habitat monitoring projects in Pennsylvania. In addition to his bird experience, Mr. Cashen has surveyed for carnivores, bighorn sheep, and other mammals; special-status amphibian species; and various fish species.

PROFESSIONAL EXPERIENCE

Litigation Support / Expert Witness

Mr. Cashen serves as the biological resources expert for the San Francisco law firm of Adams Broadwell Joseph & Cardozo. He is responsible for reviewing CEQA/NEPA documents, assessing biological resource issues, preparing written comments, providing public testimony, and interfacing with public resource agencies.

REPRESENTATIVE EXPERIENCE

- Victorville 2 Solar-Gas Hybrid Power Project: Victorville, CA (338-acre natural gas and solar energy facility) – Review of CEQA equivalent documents and preparation of written documents.
- Avenal Energy Power Plant: Avenal, CA (148-acre natural gas facility) – Review of CEQA equivalent documents and preparation of written documents.
- Ivanpah Solar Electric Generating System: Ivanpah, CA (3700-acre solar facility) – Review of CEQA equivalent documents and preparation of written documents.
- Carrizo Energy Solar Farm: San Luis Obispo County, CA (640-acre solar energy facility) – Review of CEQA equivalent documents. Preparation of data requests, comments on Preliminary Staff Assessment, comments on wildlife corridor model

(CEQA equivalent documents).

- Live Oak Master Plan: Hanford, CA (390-acre housing development) – Review of CEQA documents and preparation of comment letter.
- Rollingwood: Vallejo, CA (214-unit housing development) – Review of CEQA documents and preparation of comment letter.
- Columbus Salame: Fairfield, CA (430,000 ft^2 food processing plant) – Review of CEQA documents and preparation of comment letter.
- Concord Naval Weapons Station: Concord, CA (5028-acre redevelopment) – Review of CEQA documents, preparation of comment letters, and provision of public testimony at County hearings.
- Chula Vista Bayfront Master Plan: Chula Vista, CA (556-acre development) – Review of CEQA documents and preparation of comment letter.
- Beacon Solar Energy Project: California City, CA (2012-acre solar facility) – Review of CEQA equivalent and NEPA documents. Preparation of data requests, comments on Preliminary Staff Assessment, comments on Incidental Take Permit Application. Expert witness providing testimony at California Energy Commission hearings.
- Solar One Power Project: San Bernardino County, CA (8230-acre solar facility) – Review of CEQA equivalent and NEPA documents and preparation of data requests. Expert witness providing testimony at California Energy Commission hearings.
- Solar Two Power Project: Imperial County, CA (6500-acre solar facility) – Review of CEQA equivalent and NEPA documents. Preparation of data requests and other documents for case record. Expert witness providing testimony at California Energy Commission hearings.
- Alves Ranch: Pittsburgh, CA (320-acre housing development) – Review of CEQA documents.
- Roddy Ranch: Antioch, CA (640-acre housing and hotel development) – Review of CEQA documents and preparation of comment letter.
- Aviano: Antioch, CA (320-acre housing development) – Review of CEQA documents.
- Western GeoPower Power Plant and Steamfield: Geyserville, CA (887-acre geothermal facility) – Review of CEQA documents and preparation of comment letter.
- Sprint-Nextel Tower: Walnut Creek, CA (communications tower in open space preserve) - Review of project documents and preparation of comment letter.

Project Management

Mr. Cashen has managed several large-scale and high profile natural resources investigations. High profile projects involving multiple resources often require consideration of differing viewpoints on how resources should be managed, and they are usually subject to intense scrutiny. Mr. Cashen is accustomed to these challenges, and he

is experienced in facilitating the collaborative process to meet project objectives. In addition, the perception of high profile projects can be easily undermined if inexcusable mistakes are made. To prevent this, Mr. Cashen bases his work on solid scientific principles and proven sampling designs. He also solicits input from all project stakeholders, and provides project stakeholders with regular feedback on project progress. Mr. Cashen's educational and project background in several different natural resource disciplines enable him to consult on multiple natural resources simultaneously and address the many facets of contemporary land management in a cost-effective manner.

REPRESENTATIVE EXPERIENCE

- Forest health improvement projects – Biological Resources *(CDF: San Diego and Riverside Counties)*
- San Diego Bark Beetle Tree Removal Project – Biological Resources, Forestry, and Cultural Resources *(San Diego Gas & Electric: San Diego Co.)*
- San Diego Bark Beetle Tree Removal Project - Forestry *(San Diego County/NRCS)*
- Mather Lake Resource Management Study and Plan – Biological Resources, Hydrology, Soils, Recreation, Public Access, CEQA compliance, Historic Use *(Sacramento County: Sacramento)*
- "KV" Spotted Owl and Northern Goshawk Inventory *(USFS: Plumas NF)*
- Amphibian Inventory Project *(USFS: Plumas NF)*
- San Mateo Creek Steelhead Restoration Project – TES species, Habitat Mapping, Hydrology, Invasive Species Eradication, Statistical Analysis *(Trout Unlimited and CA Coastal Conservancy: Orange County)*
- Hillslope Monitoring Project – Forest Practice Research *(CDF: throughout California)*
- Placer County Vernal Pool Study – Plant and Animal Inventory, Statistical Analysis *(Placer County: throughout Placer County)*
- Weidemann Ranch Mitigation Project – Mitigation Monitoring and Environmental Compliance *(Toll Brothers, Inc.: San Ramon)*
- Delta Meadows State Park Special-status Species Inventory – Plant and Animal Species Inventory, Special-status Species *(CA State Parks: Locke)*
- Ion Communities Biological Resource Assessments – Biological Resource Assessments *(Ion Communities: Riverside and San Bernardino Counties)*
- Del Rio Hills Biological Resource Assessment – Biological Resource Assessments *(The Wyro Company: Rio Vista)*

Biological Resources

Mr. Cashen has a diverse background in biology. His experience includes studies of a variety of fish and wildlife species, and work in many of California's ecosystems. Mr. Cashen's specialties include conducting comprehensive biological resource assessments, habitat restoration, species inventories, and scientific investigations. Mr. Cashen has led investigations on several special-status species, including ones focusing on the foothill yellow-legged frog, mountain yellow-legged frog, steelhead, burrowing owl, California spotted owl, northern goshawk, willow flycatcher, and forest carnivores. Mr. Cashen was responsible for the special-status species inventory of Delta Meadows State Park, and for conducting a research study for Placer County's Natural Community Conservation Plan.

REPRESENTATIVE EXPERIENCE

Avian

- Study design and Lead Investigator - Delta Meadows State Park Special-status Species Inventory *(CA State Parks: Locke)*
- Study design and lead bird surveyor - Placer County Vernal Pool Study *(Placer County: throughout Placer County)*
- Surveyor - Willow flycatcher habitat mapping *(USFS: Plumas NF)*
- Independent surveyor - Tolay Creek, Cullinan Ranch, and Guadacanal Village restoration projects *(Ducks Unlimited/USGS: San Pablo Bay)*
- Study design and Lead Investigator - Bird use of restored wetlands research *(Pennsylvania Game Commission: throughout Pennsylvania)*
- Study design and surveyor - Baseline inventory of bird species at a 400-acre site in Napa County *(HCV Associates: Napa)*
- Surveyor - Baseline inventory of bird abundance following diesel spill *(LFR Levine-Fricke: Suisun Bay)*
- Study design and lead bird surveyor - Green Valley Creek Riparian Restoration Site *(City of Fairfield: Fairfield, CA)*
- Surveyor - Burrowing owl relocation and monitoring of artificial habitat *(US Navy: Dixon, CA)*
- Surveyor - Pre-construction raptor and burrowing owl surveys *(various clients and locations)*
- Surveyor - Backcountry bird inventory *(National Park Service: Eagle, Alaska)*
- Lead surveyor - Tidal salt marsh bird surveys (*Point Reyes Bird Observatory: throughout Bay Area*)

Amphibian

- Crew Leader - Red-legged frog, foothill yellow-legged frog, and mountain yellow-legged frog surveys *(USFS: Plumas NF)*
- Surveyor - Foothill yellow-legged frog surveys *(PG&E: North Fork Feather River)*
- Surveyor - Mountain yellow-legged frog surveys *(El Dorado Irrigation District: Desolation Wilderness)*
- Crew Leader - Bullfrog eradication *(Trout Unlimited: Cleveland NF)*

Fish and Aquatic Resources

- Surveyor - Hardhead minnow and other fish surveys *(USFS: Plumas NF)*
- Surveyor - Weber Creek aquatic habitat mapping (*El Dorado Irrigation District: Placerville, CA*)
- Surveyor - Green Valley Creek aquatic habitat mapping *(City of Fairfield: Fairfield, CA)*
- GPS Specialist - Salmonid spawning habitat mapping *(CDFG: Sacramento River)*
- Surveyor - Fish composition and abundance study (*PG&E: Upper North Fork Feather River and Lake Almanor*)
- Crew Leader - Surveys of steelhead abundance and habitat use *(CA Coastal Conservancy: Gualala River estuary)*
- Crew Leader - Exotic species identification and eradication *(Trout Unlimited: Cleveland NF)*

Mammals

- Principal Investigator – Peninsular bighorn sheep resource use and behavior study (*California State Parks: Freeman Properties*)
- Scientific Advisor – Red Panda survey and monitoring methods *(The Red Panda Network: CA and Nepal)*
- Surveyor - Forest carnivore surveys *(University of CA: Tahoe NF)*
- Surveyor - Relocation and monitoring of salt marsh harvest mice and other small mammals *(US Navy: Skagg's Island, CA)*

Natural Resource Investigations / Multiple Species Studies

- Scientific Review Team Member – Member of the science review team assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.

- Lead Consultant - Baseline biological resource assessments and habitat mapping for CDF management units *(CDF: San Diego, San Bernardino, and Riverside Counties)*
- Biological Resources Expert – Peer review of CEQA/NEPA documents (*Adams Broadwell Joseph & Cardoza: California)*
- Lead Consultant - Pre- and post harvest biological resource assessments of tree removal sites *(SDG&E: San Diego County)*
- Crew Leader - T&E species habitat evaluation for BA in support of a steelhead restoration plan *(Trout Unlimited: Cleveland NF)*
- Lead Investigator - Resource Management Study and Plan for Mather Lake Regional Park *(County of Sacramento: Sacramento, CA)*
- Lead Investigator - Wrote Biological Resources Assessment for 1,070-acre Alfaro Ranch property *(Yuba County, CA)*
- Lead Investigator - Wildlife Strike Hazard Management Plan *(HCV Associates: Napa)*
- Lead Investigator - Del Rio Hills Biological Resource Assessment *(The Wyro Company: Rio Vista, CA)*
- Lead Investigator – Ion Communities project sites (*Ion Communities: Riverside and San Bernardino Counties*)
- Surveyor – Tahoe Pilot Project: CWHR validation *(University of California: Tahoe NF)*

Forestry

Mr. Cashen has five years of experience working as a consulting forester on projects throughout California. During that time, Mr. Cashen has consulted with landowners and timber harvesters on best forest management practices; and he has worked on a variety of forestry tasks including selective tree marking, forest inventory, harvest layout, erosion control, and supervision of logging operations. Mr. Cashen's experience with many different natural resources enable him to provide a holistic approach to forest management, rather than just management of timber resources.

REPRESENTATIVE EXPERIENCE

- Lead Consultant - CDF fuels treatment projects *(CDF: San Diego, Riverside, and San Bernardino Counties)*
- Lead Consultant and supervisor of harvest activities – San Diego Gas and Electric Bark Beetle Tree Removal Project *(SDG&E: San Diego)*
- Crew Leader - Hillslope Monitoring Program *(CDF: throughout California)*
- Consulting Forester – Inventory and selective harvest projects *(various clients throughout California)*

EDUCATION / SPECIAL TRAINING

M.S. Wildlife and Fisheries Science, The Pennsylvania State University (1998)

B.S. Resource Management, The University of California-Berkeley (1992)

Forestry Field Program, Meadow Valley, California, Summer (1991)

PERMITS

U.S. Fish and Wildlife Service Section 10(a)(1)(A) Recovery Permit for the Peninsular bighorn sheep

CA Department of Fish and Game Scientific Collecting Permit

PROFESSIONAL ORGANIZATIONS / ASSOCIATIONS

The Wildlife Society

Society of American Foresters

Mt. Diablo Audubon Society

OTHER AFFILIATIONS

Scientific Advisor and Grant Writer – *The Red Panda Network*

Scientific Advisor – *Mt. Diablo Audubon Society*

Grant Writer – *American Conservation Experience*

Land Committee Member – *Save Mt. Diablo*

TEACHING EXPERIENCE

Instructor: Wildlife Management, The Pennsylvania State University, 1998

Teaching Assistant: Ornithology, The Pennsylvania State University, 1996-1997

EXHIBIT 304

ATTACHMENT 2

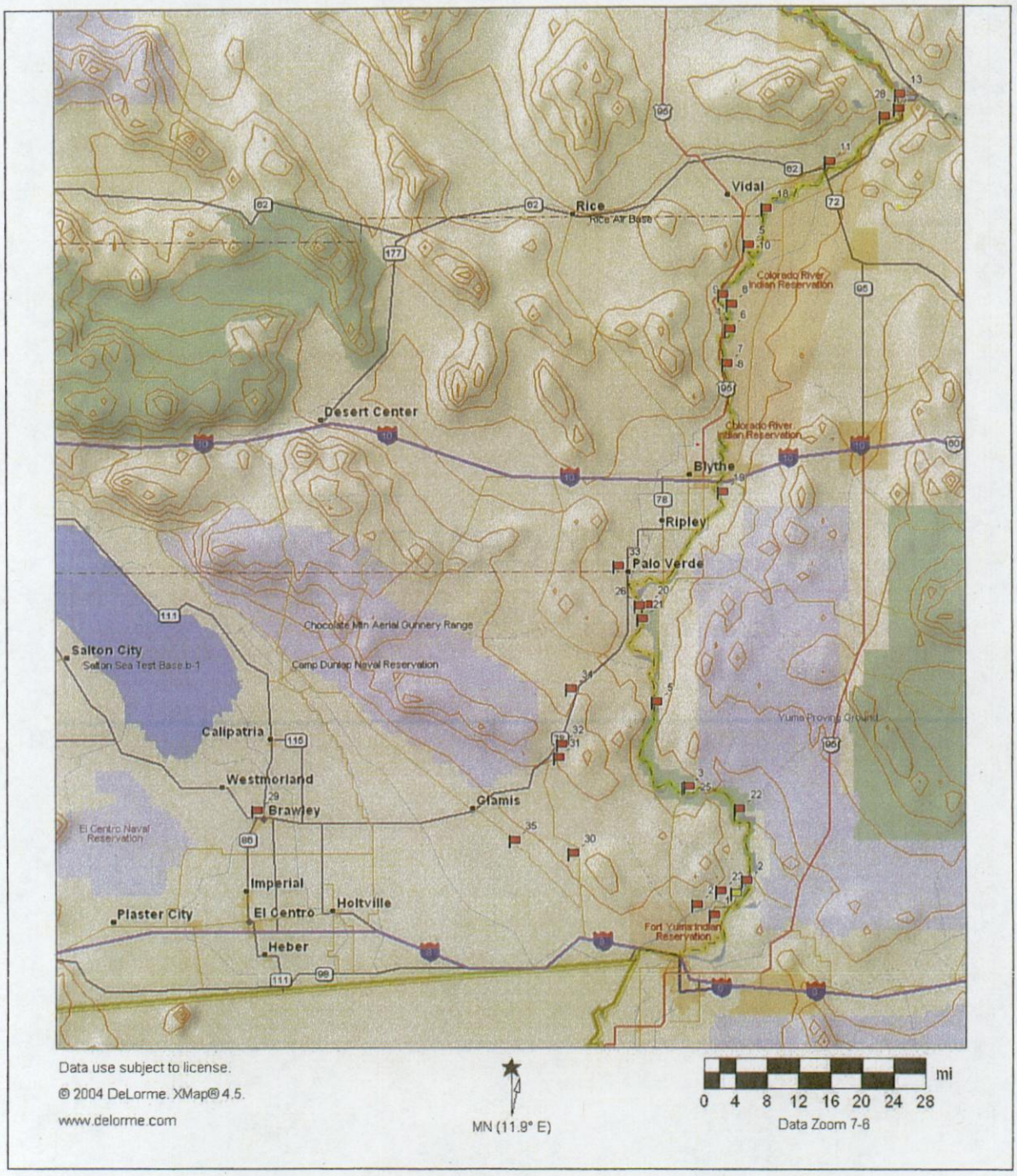


Figure 1. Documented occurrences of Gila woodpeckers (red flags).[1] Flag numbers correspond with CNDDB occurrence numbers.

---

[1] From California Natural Diversity Database. 2009. Rarefind [computer program]. Version 3.1.0. Mar 2, 2010. Sacramento (CA): Wildlife & Habitat Data Analysis Branch. California Department of Fish and Game.

EXHIBIT 305

ATTACHMENT 3

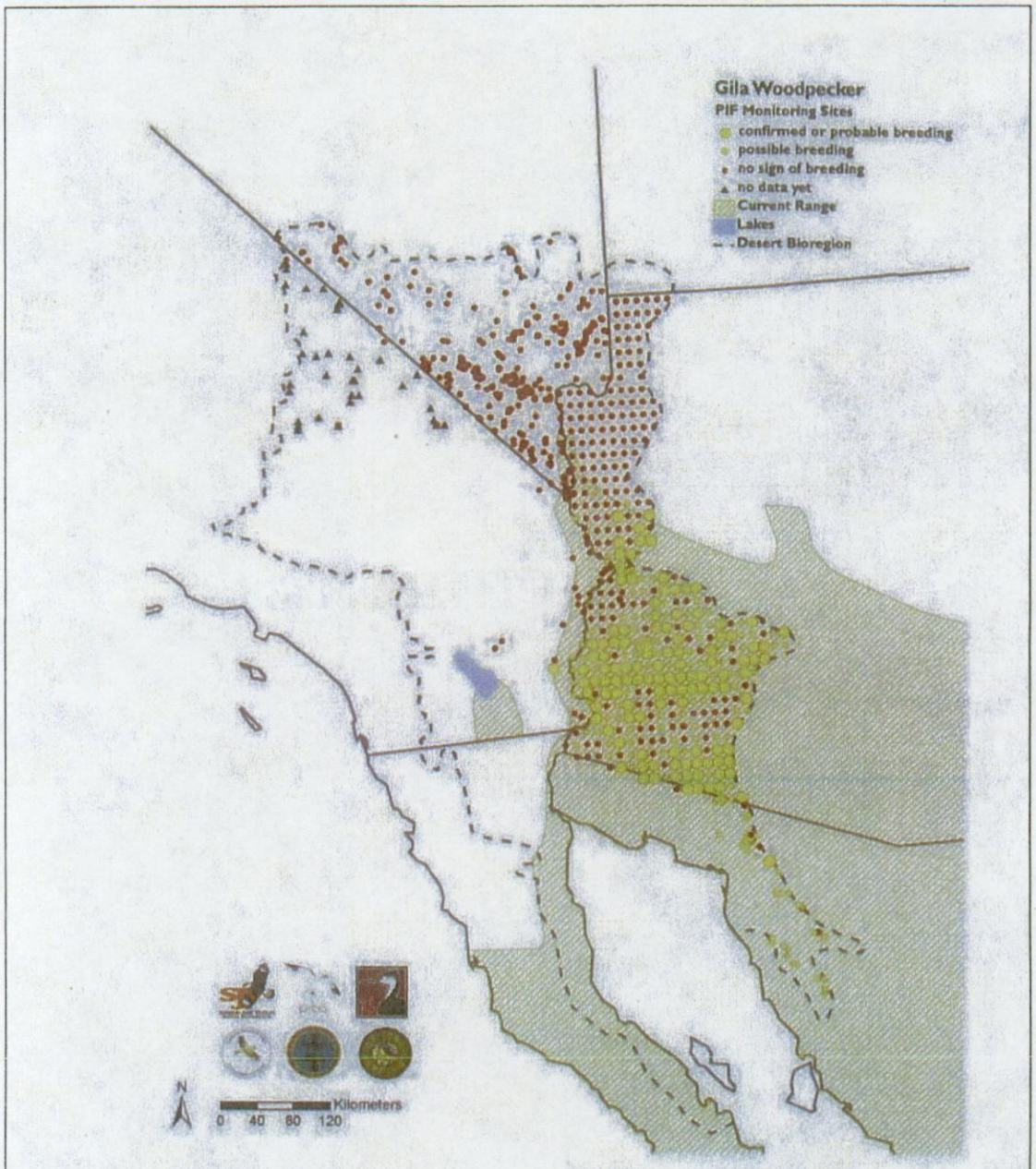


Figure 5-3. CalPIF monitoring sites, breeding status, and current range for the Gila Woodpecker in California.

Figure 2. Current (2009) range of the Gila woodpecker in California.[1]

---

[1] From CalPIF (California Partners in Flight). 2009. Version 1.0. The Desert Bird Conservation Plan: a
Strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California.
Partners in Flight. http://www.prbo.org/calpif/plans.html.

EXHIBIT 306

ATTACHMENT 4

DOCKET
09-AFC-5
DATE FEB 05 2010
RECD. FEB 24 2010

To: Craig Hoffman, Energy Commission Project Manager

From: Heather Blair, Energy Commission Staff Biologist (Aspen Environmental Group)

Date: February 5, 2010

Re: Abengoa Mojave Solar Project – time-sensitive issues and informational needs

Completion of the draft Staff Assessment and its review by USFWS and CDFG facilitated the identification of several time-sensitive issues. Staff believes it will benefit the project schedule to relay this information to the applicant now rather than wait to publish it in the Staff Assessment in March 2010. Staff strongly recommends continued coordination with USFWS (Ashleigh Blackford) and CDFG (Eric Weiss) regarding plan development, permit requirements/timing, compliance with updates to the Bald and Golden Eagle Act (e.g., survey and foraging habitat assessment procedures), and compensatory mitigation. Staff is also available to answer questions about these informational needs.

The documents and information listed below **need to be submitted** by the applicant to the Energy Commission, USFWS, and CDFG:

- Draft Desert Tortoise Exclusion Fencing, Clearance Survey, and Translocation Plan (Desert Tortoise Plan). See below.
- Draft Burrowing Owl Monitoring and Mitigation Plan (Burrowing Owl Plan). See below.
- Swainson's Hawk Survey Results – Spring 2010. As proposed by the applicant in their draft California Endangered Species Act Section 2081 Incidental Take Permit Application.
- Golden Eagle Survey Results and Foraging Habitat Assessment. Required to determine compliance with recent updates to the Bald and Golden Eagle Act, including whether the project would require a take permit. Contact USFWS for guidance on survey protocol and foraging habitat assessment methodology, as it becomes available. Analysis of the survey results and coordination between staff, the applicant, and USFWS is necessary to determine whether a take permit is required for impacts to golden eagle, including loss of foraging habitat.
- Compensatory Mitigation Details:
  - Identification of which 118.2 acre portion of the 233 acre applicant-owned parcel is proposed for mitigation;
  - Evaluation of the degree of disturbance, dumping, historical structures, etc. that may require cleaning, fencing, repairs, demolition, etc.; and
  - Determination of whether the applicant would conduct the aforementioned work (if required) prior to conserving the land or if additional lands or monies will be required to off-set the aforementioned impediments.

It is requested that these plans, survey results, and information be submitted as soon as possible to allow time for review, analysis, and incorporation into conditions of certification, in advance of the Supplemental Staff Assessment (publication scheduled for early May 2010). Of particular importance are the draft Desert Tortoise Plan, draft Burrowing Owl Plan, Swainson's hawk and golden eagle survey results and foraging habitat assessment, and compensatory mitigation details, all of which need to be addressed by staff in the Supplemental Staff Assessment. The following measures, which were developed in coordination with USFWS and CDFG, present substantive guidance for preparation of the draft Desert Tortoise and Burrowing Owl plans. The final Desert Tortoise Plan must be submitted to USFWS with the Biological Assessment, which is currently scheduled to be submitted to the U.S. Department of Energy in February 2010; therefore, a draft plan must be submitted and reviewed as soon as possible.

Staff recommends that careful consideration be given to the timing of burrowing owl and desert tortoise clearance surveys in relation to the overall project construction schedule. As described below, the clearance surveys must be conducted within specific timing and environmental parameters. In coordination with USFWS and CDFG, staff identified two potential scenarios specific to the AMS project that would allow construction to proceed in compliance with these timing restrictions. It is understood that there are other potential scenarios and staff encourages the applicant to present these and other scenarios for approval in the draft Desert Tortoise and Burrowing Owl plans.

1. At site mobilization in Fall/Winter 2010, install temporary desert tortoise exclusion fencing partially around (within 250 feet of) all potential tortoise burrows ***while maintaining connectivity to suitable natural habitat*** adjacent to the project site. Determine presence or absence of burrowing owl during that same timeframe (to determine compensatory mitigation and the number of artificial burrows). Color-banding and passive relocation of non-nesting burrowing owl can occur outside of the temporary exclusion fence (within the proposed project area) at any time. However, if it is determined that an active nest is present onsite, a no disturbance buffer must be established within 250 feet of the active burrowing owl nest and remain until juveniles from the occupied burrows are foraging independently and are capable of independent survival. Desert tortoise clearance would be conducted April through May and/or September through October.
2. Fence the site and conduct burrowing owl and desert tortoise clearance concurrently in September or October (provided the environmental requirements below are satisfied).

Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan

A Desert Tortoise Exclusion Fencing, Clearance Surveys, and Translocation Plan shall be developed in consultation with the CPM, CDFG, and USFWS. This plan shall include detailed measures to avoid and minimize impacts to desert tortoise in and near the construction areas as well as methods for clearance surveys, fence installation, tortoise handling, artificial burrow construction, egg handling and other procedures, which shall be consistent with those described in the USFWS Desert Tortoise Field Manual (www.fws.gov/ventura/speciesinfo/protocols_guidelines) or more current guidance provided by CDFG and USFWS. At a minimum, the following measures shall be included in the plan and implemented by the project owner to manage their construction site, and related facilities, in a manner to avoid, minimize, or mitigate impacts to desert tortoise.

1. Fence Installation. Prior to ground disturbance, the entire project site shall be fenced with desert tortoise exclusion fence. To avoid impacts to desert tortoise during fence construction, the proposed fence alignment shall be flagged and the alignment surveyed within 24 hours prior to fence construction. Surveys shall be conducted by the Designated Biologist using techniques approved by the USFWS and CDFG. Biological Monitors may assist the Designated Biologist under his or her supervision. These surveys shall provide 100 percent coverage of all areas to be disturbed during fence construction and an additional transect along both sides of the proposed fence line. This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment. Transects shall be no greater than 30 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with USFWS-approved protocol.

    a. Timing and Supervision of Fence Installation. The exclusion fencing shall be installed prior to site clearing and grubbing. The fence installation shall be supervised by the Designated Biologist and monitored by the Biological Monitors to ensure the safety of any tortoise present.

    b. Fence Material and Installation. The permanent tortoise exclusionary fencing shall consist of galvanized hard wire cloth 1 by 2 inch mesh sunk 12 inches into the ground, and 24 inches above ground (refer to parameters for USFWS-approved tortoise exclusion fencing at www.fws.gov/ventura/speciesinfo/protocols_guidelines). For temporary exclusion fencing, a "folded bottom" technique shall be implemented. This method follows the same guidelines as installation of permanent fencing except instead of burying the bottom 12 inches of the fencing, it is bent at a approximately 90 degree angle (to follow the contour of the ground) and spikes or other retaining methods are driven into the ground every two linear feet in such a manner as to "anchor" the bottom of the fence. This method eliminates the need for trenching, which for short-term temporary impacts may be more beneficial to the recovery of the landscape, and thus the species.

c. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates shall remain closed except during vehicle passage and may be electronically activated to open and close immediately after vehicle(s) have entered or exited to prevent extended periods with open gates, which might lead to a tortoise entering. Cattle grating designed to safely exclude desert tortoise shall be installed at the gated entries to discourage tortoises from gaining entry.

d. Transmission Interconnection Fencing. The Transmission Interconnection Area shall be temporarily fenced with tortoise exclusion fencing to prevent desert tortoise entry during construction. Temporary fencing must follow guidelines for permanent fencing and supporting stakes shall be sufficiently spaced to maintain fence integrity. Temporary exclusion and translocation of desert tortoise in the Transmission Interconnection Area shall be addressed in the Desert Tortoise Translocation Plan.

e. Stormwater Drainage Fencing. The onsite stormwater drainage channels, including the headwalls, outlet, and road crossings, shall be permanently fenced to ensure exclusion of desert tortoise during AMS operation.

f. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site and stormwater drainage fencing and temporary fencing in the interconnection area, the fencing shall be regularly inspected. Permanent fencing shall be inspected monthly and during/immediately following all major rainfall events. Any damage to the fencing shall be temporarily repaired immediately to keep tortoises out of the site, and permanently repaired within two days of observing damage. Inspections of permanent site fencing shall occur for the life of the project. Temporary fencing must be inspected immediately following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted tortoise entry while damaged, the Designated Biologist shall inspect the utility corridor or tower site for tortoise.

2. Desert Tortoise Clearance Surveys. Following construction of the tortoise exclusionary fencing around the Plant Site, all fenced areas shall be cleared of tortoises by the Designated Biologist, who may be assisted by Biological Monitors. A minimum of two, 100 percent coverage protocol clearance surveys with negative results must be completed and these must coincide with heightened desert tortoise activity from April through May and September through October. Non-protocol clearance surveys may be conducted in areas of certainly unsuitable habitat (e.g., developed) with prior approval of specific areas by USFWS and CDFG (these proposed areas shall be identified in the draft Desert Tortoise Plan). To facilitate seeing the ground from different angles, the second clearance survey shall be walked at 90 degrees to the orientation of the first clearance survey. Additional clearance survey guidelines provided in the USFWS *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines).

3. Translocation of Desert Tortoise. If desert tortoises are detected during clearance surveys within the project impact area, the Designated Biologist shall safely

translocate the tortoise the shortest possible distance to the nearest suitable habitat as described below. Any handling efforts shall be in accordance with techniques described in the USFWS's *Desert Tortoise Field Manual* (www.fws.gov/ventura/speciesinfo/protocols_guidelines).

a. If a tortoise is discovered within the project site, it shall be safely translocated to the nearest desert saltbush scrub or Mojave creosote bush scrub east and south of section 33 or the nearest desert saltbush scrub west and south of section 30.

b. If a tortoise will be moved a distance greater than 5 km, disease testing and monitoring shall be conducted in accordance with the approved final Desert Tortoise Translocation Plan.

c. If a visibly diseased tortoise is encountered onsite, procedures shall be implemented in accordance with the approved final Desert Tortoise Plan.

4. Burrow Inspection. All potential desert tortoise burrows within the fenced area shall be searched for presence. To prevent reentry by a tortoise or other wildlife, all burrows shall be collapsed once absence has been determined. Immediately following excavation and if environmental conditions warrant immediate translocation, tortoises excavated from burrows shall be translocated to unoccupied natural or artificial burrows within the location approved by USFWS and CDFG per the final Desert Tortoise Translocation Plan.

5. Burrow Excavation. Burrows inhabited by tortoises shall be excavated by the Designated Biologist using hand tools, and then collapsed or blocked to prevent re-occupation. If excavated during May through July, the Designated Biologist shall search for desert tortoise nests/eggs. All desert tortoise handling and removal, and burrow excavations, including nests, shall be conducted by the Designated Biologist in accordance with the USFWS-approved protocol (Desert Tortoise Council 1999) or more current guidance on the USFWS website.

6. Monitoring During Clearing. Following the installation of exclusionary fencing and after ensuring desert tortoises are absent from the project site, heavy equipment shall be allowed to enter the project site to perform earth work such as clearing, grubbing, leveling, and trenching. A Biological Monitor shall be onsite at all times during initial clearing and grading activities. Should a tortoise be discovered, it shall be relocated as described above in accordance with the final Desert Tortoise Translocation Plan.

7. Reporting. The Designated Biologist shall record the following information for any desert tortoises handled: a) the locations (narrative and maps) and dates of observation; b) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; c) location moved from and location moved to (using GPS technology); d) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked lateral scutes); e) ambient temperature when handled and released; and f) digital photograph of each handled desert tortoise as described in the paragraph below. Desert tortoise moved from within project areas shall be marked for future identification as described in *Guidelines for Handling Desert Tortoise during Construction Projects* (Desert

Tortoise Council 1999) or more current guidance on the USFWS website. Digital photographs of the carapace, plastron, and fourth costal scute shall be taken. Scutes shall not be notched for identification.

Burrowing Owl Impact Avoidance and Minimization Measures

Prior to preconstruction surveys, a Burrowing Owl Monitoring and Mitigation Plan (Burrowing Owl Plan) shall be developed by the project owner in consultation with the CPM and CDFG. This plan shall include detailed measures to avoid and minimize impacts to burrowing owls in and near the construction areas (if indentified during surveys) and shall be consistent with CDFG guidance (CDFG 1995). In addition, the plan shall identify the optimal time to concurrently relocate both desert tortoise and burrowing owl. At a minimum, the following measures shall be included in the plan and implemented by the project owner to manage their construction site, and related facilities, in a manner to avoid, minimize, or mitigate impacts to breeding and foraging burrowing owls.

1. Pre-Construction Surveys and Nest Avoidance. The Designated Biologist shall conduct pre-construction surveys for burrowing owls within the project site and a 160-foot buffer. These surveys shall be conducted concurrent with desert tortoise clearance surveys, to the maximum extent possible. The following shall be included in the Plan and implemented to avoid and minimize impacts to burrowing owls onsite:

    a. Ground-disturbing actions should be carried out from September 1 to January 31, which is prior to the burrowing owl nesting season and also potentially within the desert tortoise active season, depending on ground and climate conditions.

    b. A 250-foot exclusion area around occupied burrows will be flagged and this area will not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival. The exclusion area shall remain connected to natural area(s) to the extent possible, to avoid completely surrounding the owl with construction activities and/or equipment.

2. Artificial Burrow Installation. Prior to any ground-disturbing activities, the project owner shall install five artificial burrows for each identified burrowing owl burrow in the project area that would be destroyed, within in the approved compensatory habitat area. The Designated Biologist shall survey the site selected for artificial burrow construction to verify that such construction will not affect desert tortoise or Mohave ground squirrel or existing burrowing owl colonies in the relocation area. Installation of the artificial burrows shall occur after baseline surveys of the relocation area and prior to ground disturbance or heavy equipment staging. Design of the artificial burrows shall be consistent with CDFG guidelines (CDFG 1995) and shall be approved by the CPM in consultation with CDFG.

3. Passive Relocation. Prior to passive relocation, any owls that will be relocated shall be color banded in accordance with the guidance provided by USGS bird banding lab (http://www.pwrc.usgs.gov/bbl) to monitor relocation success; this shall not be conducted during the breeding season. During the non-breeding season, owls would

be given a minimum of three weeks to become familiar with the new artificial burrows, after which eviction of owls within the project site could begin. Use of one-way doors described by Trulio (1995) and Clark and Plumpton (2005) would be used to facilitate passive relocation of owls.

a. Monitoring and Success Criteria. The Designated Biologist shall survey the relocation area during the nesting season to assess use of the artificial burrows by owls using methods consistent with Phase II and Phase III Burrowing Owl Consortium Guideline protocols (CBOC 1993). Surveys shall start upon completion of artificial burrow construction and shall continue for a period of five years. If survey results indicate burrowing owls are not nesting on the relocation area, remedial actions shall be developed and implemented in consultation with the CPM, CDFG and USFWS to correct conditions at the site that might be preventing owls from nesting there. A report describing survey results and remedial actions taken shall be submitted to the CPM, CDFG and USFWS no later than January 31 of each year for five years.

4. Preserve and Manage Compensatory Habitat. For each individual owl or pair identified on the project site during pre-construction surveys, 6.5 acres shall be preserved and managed in perpetuity for the occupation of burrowing owls. This compensatory habitat shall be in addition to the acreage required to mitigate impacts to desert tortoise and Mohave ground squirrel.

   The compensatory habitat shall be managed for the benefit of burrowing owls, with the specific goals of:

   a. Maintaining the functionality of artificial and natural burrows; and

   b. Minimizing the occurrence of weeds (species considered "moderate" or "high" threat to California wildlands as defined by CAL-IPC [2006] and noxious weeds rated "A" or "B" by the California Department of Food and Agriculture and any federal-rated pest plants [CDFA 2009]) at less than 10 percent cover of the shrub and herb layers.

   The Burrowing Owl Plan shall also include monitoring and maintenance requirements, details on methods for measuring compliance goals and remedial actions to be taken if management goals are not met.

   The final Burrowing Owl Plan is due before preconstruction surveys begin to ensure that an approved relocation methodology will be followed for any owls occurring within the project area. Therefore, it is understood that the compensatory mitigation acreage (if required) will not be identified in the Burrowing Owl Plan. However, the Plan shall propose a location for compensatory mitigation land and the methodology to quantify the acreage required, as outlined above. If owls are identified during the pre-construction survey, the project owner shall submit an addendum to the Burrowing Owl Plan, which identifies the exact acreage to be preserved and

managed in perpetuity for burrowing owl based on the results of the preconstruction survey and as agreed to in consultation with CDFG.

ATTACHMENT 306-A

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

REBUTTAL TESTIMONY OF SCOTT CASHEN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 15, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

2398-067a

I. Introduction

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Blythe Solar Power Project ("Project" or "BSPP") since the data adequacy phase. I have reviewed numerous documents and have conducted my own investigations and analyses regarding the Project's potential environmental impacts and alternatives.

I have a Master's of Science Degree in Wildlife and Fisheries Science from the Pennsylvania State University, University Park. The degree program included coursework in Landscape Ecology, Biometrics, Statistics, Conservation Biology, and Wetland Ecology. For my thesis, I conducted seven seasons of independent research on avian use of restored wetlands. The U.S. Fish and Wildlife Service subsequently used my technical report as a model for other habitat restoration monitoring projects in Pennsylvania.

My employment experience has included work in the fields of wildlife biology, forestry, and natural resource consulting. Much of my work over the past two and a half years has involved review of environmental documents associated with development of large-scale solar energy facilities. To date, I have served as an expert on 12 different solar projects, 9 of which are being sited in the Mojave or Sonoran Desert. I am currently concluding a two-year contract I hold with the State of California to conduct surveys for the Peninsular bighorn sheep near Anza-Borrego Desert State Park. I serve as a member of the scientific review team responsible for assessing the effectiveness of the US Forest Service's implementation of the Herger-Feinstein Quincy Library Group Act.

For the past two and a half years I have operated my own consulting business. I previously served as a Senior Biologist for TSS Consultants and ECORP Consulting. Other positions I have held have included conducting wildlife research for the National Park Service, the Point Reyes Bird Observatory, and the University of California. While in graduate school I served as an instructor of Wildlife Management and as a teaching assistant for a course on ornithology. A summary of my education and professional experience is attached to this testimony as provided with my opening testimony.

My testimony is based on the activities described above, the Applicant's opening testimony dated June 11, 2010, and the knowledge and experience I have acquired during more than 18 years of working in the field of natural resources management.

II. Mitigation for Potentially Significant Project Noise Impacts on Birds

The Applicant argues Staff has imposed excessive and unreasonable restrictions on Project noise from "steam blows."[1] According to the Applicant's testimony,

> The nearest undisturbed area (i.e., native habitat) that would potentially support nesting birds is located approximately 3,200 feet away from each steam blow source location. Given these variables, the expected noise level at the potential nesting areas would be approximately 59 dBA, well below the normally applied threshold of 65 dBA (65 dBA would occur approximately 1,600 feet from the source).[2]

Neither the Applicant's testimony nor the scientific literature supports the contention that 59 dBA can be used as a no-effect threshold. Research on the effects of noise on birds indicates large intra and inter-species variations. [3, 4, 5] Site-specific assessments are therefore necessary to demonstrate site and species-specific thresholds. Because the Applicant has not conducted these assessments, the Applicant has no basis to conclude noise levels of 59 dBA would not result in significant impacts to nesting birds. To the contrary, research on the effects of traffic noise on breeding birds concluded ambient noise up to a given level resulted in no reduction in the density of bird populations.[6] However, once an ambient noise threshold level was exceeded, densities decreased exponentially with increased noise.[7] Threshold levels were found to range from 36 to 58 decibels, depending on the species.[8]

Reijnen et al. (1997) concluded sound levels above 50 dBA could be considered potentially deleterious to breeding birds. The average distance (from the source of noise) at which an effect was observed in the Reijnen et al.

---

[1] Applicant's Biological Resources Opening Testimony, p. 13.
[2] Id.
[3] National Park Service. 1994. Report to Congress: Report on effects of aircraft overflights on the National Park System.
[4] Larkin R. 1996. Effects of military noise on wildlife: A literature review. USA CERL Technical Report [internet; cited 28 Sep 2008]. Available from: http://nhsbig.inhs.uiuc.edu/bioacoustics/noise_and_wildlife.pdf.
[5] Manci KM, DN Gladwin, R Villella, MG Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. National Ecology Research Center Report # NERC-88/29.
[6] Kaseloo PA. 2006. Synthesis of noise effects on wildlife populations. IN: Proceedings of the 2005 International Conference on Ecology and Transportation, Eds. Irwin CL, Garrett P, McDermott KP. Center for Transportation and the Environment, North Carolina State University, Raleigh, NC: pp. 33-35. Attached hereto as Attachment 1.
[7] Id.
[8] Id.

study was reported to be 1,000 m (3,280 feet).[9] This distance is comparable to that reported by the Applicant (i.e., 3,200 feet), although noise levels from the Applicant's proposed method for steam blows would exceed those reported as deleterious by Reijnen et al.

Many wildlife species are more susceptible to adverse effects from "startle" due to impulsive noises, rather than "annoyance" due to a change in overall noise levels. According to Staff, equipment for a quieter steam blow process, which would also reduce impacts from "startle" noise, is available and feasible mitigation to reduce Project impacts on wildlife.[10] I concur with Staff that a "low pressure" approach to steam blows should be implemented to avoid and minimize the adverse effects associated with Project steam blows.

Condition of Certification BIO-8 ("BIO-8") specifies that loud construction activities (i.e., steam blowing, both low and high pressure, and pile driving) shall be avoided from February 15 to April 15. According to the Revised Staff Assessment, these correspond with the height of the bird breeding season.[11] California Partners in Flight (2009) reports the avian breeding season in the Colorado Desert as extending from January 15 to July 15, with peak of egg initiation occurring on April 8.[12] The Revised Staff Assessment has proposed mitigation for only two of the six months during which Project noise is likely to impact nesting birds. However, due to inter-species variation in nesting chronology, Staff's proposed mitigation would be ineffective for some species. For example, the California Department of Fish and Game reports the peak breeding season for prairie falcons as occurring from April to early August (i.e., generally outside of the dates Staff has required mitigation for noise impacts).[13] Therefore, BIO-8 should be revised to require the Applicant to avoid loud construction activities from January 15th to August 15th.

---

[9] Reijnen R, R Foppen, G Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and planning and managing road corridors. Biodiversity and Conservation 6: 567-581.
[10] Revised Staff Assessment, p. C.7-8.
[11] Revised Staff Assessment, p. C.2-173.
[12] CalPIF (California Partners in Flight). 2009. Version 1.0. The Desert Bird Conservation Plan: a Strategy for Protecting and Managing Desert Habitats and Associated Birds in California. California.
Partners in Flight. http://www.prbo.org/calpif/plans.html.
[13] California Wildlife Habitat Relationships System. 2005. California Department of Fish and Game. California Interagency Wildlife Task Group. CWHR version 8.1 personal computer program. Sacramento (CA).

III. The Applicant's Proposed Changes to BIO-25 Should Be Rejected

In its opening testimony, the Applicant has proposed modifying Condition of Certification BIO-25 ("BIO-25") such that the success criterion for evaporation pond monitoring would no longer be 12 consecutive visits in which there was no mortality or entanglement. Instead, the Applicant proposes that the success criterion be 12 (non-consecutive) visits with no "*significant*" deaths or entanglement.[14] The Applicant's proposed changes should be rejected because they would increase the likelihood of significant, unmitigated Project impacts associated with the proposed evaporation ponds.

First, with the Applicant's proposed success criteria, if bird mortality occurred 11 months of the year (but not in the 12th) for years 0 through 12, the success criterion (i.e., 12 months of no significant bird or wildlife deaths) would be met and monthly monitoring would cease. This is clearly not the intent of the condition, which is to reduce bird and wildlife mortality for the life of the Project. Assuming the Project operates for 30 years, BIO-25 would cease to apply to the Project in year 13 even if significant bird mortality occurred on an annual basis. Second, the Applicant has failed to define what is considered "significant" deaths or entanglement. As a result, the Applicant's proposed success criterion is arbitrary and lacks any and all measurable performance standards.

IV. Potentially Significant Impacts to the Couch's Spadefoot Toad and Proposed Mitigation

In opening testimony, the Applicant provided information regarding baseline conditions for the Couch's spadefoot toad that is misleading, at best. Core to the Applicant's testimony is the argument that spadefoot toads were never detected during surveys, and thus Staff has no basis to conclude spadefoot toads would be impacted by the Project. The Applicant presents this argument four separate times in its testimony.[15] However, the Applicant neglected to report that the timing of its surveys almost certainly precluded *detection* of spadefoot toads. This is reflected in the Applicant's own testimony, which provides:

1. "[s]padefoots are mainly nocturnal with juveniles sometimes active in daylight;"[16]

---

[14] Applicant's Biological Resources Opening Testimony, p. 39.
[15] Applicant's Biological Resources Opening Testimony. One instance on p. 7 and three instances on p. 40.
[16] AECOM Environment. Data Response Queries – CEC Email dated January 28, 2010. Applicant's Exhibit 18.

2. "[t]his species spends most of the year (dry period) within either self-made burrows or small mammal burrows (Stebbins 2003) and becomes active during spring and summer rains;"[17] and
3. "[m]ating occurs after heavy rainfall in April through September."[18]

The Applicant did not conduct surveys at night, during spring or summer rains, or after heavy rainfall between April and September.[19] In fact, according to the Applicant's own testimony, "this species [Couch's spadefoot toad] was not included as a target species for our surveys."[20]

A. Potential Breeding Ponds Are Present

The Applicant accuses Staff of misleading the reader regarding the presence of potential Couch's spadefoot toad breeding sites in the Project area."[21] In opening testimony, the Applicant provides the following justification for rejecting Staff's conclusion that potential Couch's spadefoot toad breeding ponds exist in the Project area:

> The 2010 survey results indicated that there were multiple potential ponding areas that may pond long enough to support breeding habitat for the Couch's spadefoot toad; however, there is no confirmation on the ponding potential and there is no evidence that toads are in the area. Therefore, it is speculation that they are potential breeding ponds.[22]

This reasoning is nonsensical. First, "ponding areas" within the range of the toad are—by definition—*potential* breeding ponds. Second, Staff's conclusions are not mere "speculation" because according to the Applicant's own testimony, "[b]oth the Blythe and Palen sites occur within the range of Couch's spadefoot and contain sufficient forage (termites and other insects) to support this species."[23]

---

[17] Id.
[18] Id.
[19] Western Regional Climate Center [internet]. 2010. Period of Record Monthly Climate Summary, Blythe CAA Airport, California. Available at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0927. Attached hereto as Attachment 2.
[20] Id.
[21] *See* Applicant's Biological Resources Opening Testimony, p. 7.
[22] Id.
[23] AECOM Environment. Data Response Queries – CEC Email dated January 28, 2010. Applicant's Exhibit 18.

In science, the burden of proof rests on those making the claim.[24] According to the Applicant, "[q]uantitative data regarding length of potential water retention, depth of water (if any), size of the pond, and suitability for breeding were not documented" during the Applicant's surveys.[25] In this instance, the Applicant has not provided the information necessary to demonstrate that the "ponding areas" that it detected are *not* potential breeding habitat.

B. Significant Impacts and Proposed Mitigation

The Applicant's opening testimony provides that "[i]mpacts to the toad are not considered significant and should not require additional mitigation beyond the already defined avoidance and minimization measures and required compensatory mitigation."[26] However, mitigation is proposed because Staff has found that Project impacts to Couch's spadefoot toad *are* significant.[27, 28] As stated in my opening testimony, I agree with Staff's conclusion that the Project may result in potentially significant impacts to Couch's spadefoot toad.[29] Moreover, whereas "already defined avoidance and minimization measures and required compensatory mitigation" *may also* offset impacts to spadefoot toads, under those conditions the Applicant would be under no obligation to ensure that impacts to Couch's spadefoot toad will be avoided and minimized. As such, a condition that incorporates mitigation measures specific to the habitat requirements and future viability of the Couch's spadefoot toad are necessary and appropriate to mitigate the Project's potentially significant impacts to this species.

---

[24] Wikipedia contributors. Pseudoscience [Internet]. Wikipedia, The Free Encyclopedia; 2010 Jun 14, 08:44 UTC [cited 2010 Jun 15]. Available from: http://en.wikipedia.org/wiki/Pseudoscience.
[25] Applicant's Biological Resources Opening Testimony, p. 40.
[26] Id.
[27] Revised Staff Assessment, p. C.2-70.
[28] The Revised Staff Assessment incorrectly refers to BIO-27 as the condition addressing mitigation for Project impacts to Couch's spadefoot toads. The correct condition is BIO-26.
[29] Testimony of Scott Cashen on Behalf of California Unions for Reliable Energy for the Blythe Solar Power Project, June 11, 2010, p. 9.

ATTACHMENT 1

Bioacoustic Profiles: Evaluating Potential Masking of Wildlife Vocal Communication by Highway Noise

Edward West (Phone: 916-737-3000, Email: ewest@jsanet.com), Senior Environmental Scientist, Jones & Stokes, 2600 V Street, Sacramento, CA 95818

Abstract

Highway noise can mask vocal communication and natural sounds important to wildlife for mate attraction, social cohesion, predator avoidance, prey detection, navigation, and other basic behaviors. This acoustic interference can potentially result in the reduced ability of individuals to acquire mates successfully, reproduce, raise young, and avoid predation. Because different species have evolved unique vocal repertoires, they are differentially susceptible to the masking effects of highway noise. No single noise-level criteria can be used to accurately define impact thresholds for all species. Here we show the utility of using bioacoustic profiles of bird vocal signals to identify and describe the range and variability of acoustic-masking thresholds. Variation in noise load, source amplitude, and signal frequency are modeled to illustrate the dynamic nature of each species' critical acoustic space.

Biographical Sketch: Dr. Edward West specializes in applied ecological research and management of rare, threatened, and endangered wildlife; ecosystem conservation; and mitigation planning. He is a senior environmental scientist with Jones & Stokes in Sacramento and a research associate in the John Muir Institute of the Environment at UC-Davis. His current research focuses on bioacoustics analysis of highway noise impacts on wildlife, particularly how noise impacts vocal communication and associated behaviors in birds. Dr. West is a member of the Bioacoustics Working Group at the UCD Road Ecology Center where he teaches courses in bioacoustics ecology.

Estimating Effects of Highway Noise on the Avian Auditory System

Robert J. Dooling (Phone: 301-405-5925, Email: dooling@psyc.umd.edu), Center for the Comparative and Evolutionary Biology of Hearing, University of Maryland, College Park, MD 20742

Abstract: Our own common experience suggests that the adverse effects of noise on birds can be considered with regard to four potentially overlapping categories. First, noise might be annoying to birds. This may cause them to abandon a particular site that is otherwise ideal in terms of food availability, breeding opportunities, etc. Second, noise which lasts for very long periods of time can be stressful. Such noise levels can raise the level of stress hormones, interfere with sleep and other activities, etc. Thirdly, very intense noise (acoustic overexposure) can cause permanent injury to the auditory system. Finally, noise can interfere with acoustic communication by masking important sounds or sound components. The first two categories of investigation are probably best addressed by field experiments. The second two categories of effects are probably best addressed by laboratory experiments where precise control can be obtained. The results of some of these experiments are described in this paper.

Experimental Design

A series of behavioral experiments in the laboratory examined the effect of intense noise on the peripheral auditory system of birds and the effect of less-intense masking noise on the ability of birds to detect and discriminate bird vocalizations. In all, these experiments involved four species of birds (budgerigars, canaries, Japanese quail, and zebra finches) with similar audiograms. All birds were trained by behavioral conditioning methods and were tested in the same behavioral apparatus using exactly the same procedures. Birds exposed to intense noise were also exposed under identical conditions to the same exact noises. These conditions minimized differences that might be due to different non-experimental conditions or methodologies. Thus, any differences that emerged are differences between species.

Acoustic Overexposure

In spite of very similar audiograms, budgerigars and quail respond quite differently to exposure to an intense pure tone. When exposed to a 2.86-kHz tone at 112 dB for 12 hours, budgerigars show an initial threshold shift (hearing loss) of about 40 dB, which is completely recovered by 1-2 days following the exposure. Quail, on the other hand, show an initial hearing loss of 70 dB and never fully recover their hearing, even after a year following this exposure. In another experiment, budgerigars, canaries, and zebra finches were all exposed to the same band noise (2-6 kHz) at a level of 120 dB for 24 hours. Again, species differences emerged. All three species showed an initial hearing loss of about 50 dB. Canaries and zebra finches recovered their hearing to within 10 dB of normal by about two weeks. Budgerigars never fully recovered their hearing and still showed a permanent hearing loss of over 20 dB several months following the exposure. These comparative results show that in spite of similar audiograms, different species of birds show considerable variation in their response to hearing damage from acoustic overexposure.

Masking of Vocalizations by Noise

Previous work has also shown that, in spite of similar audiograms, there can be considerable species differences in how well birds can hear against a background of noise. In recent work by Lohr and his colleagues (Lohr et al, 2003), two species of birds were trained by behavioral conditioning methods to detect and discriminate both their own species vocalizations and the vocalizations of the other species. Moreover, these experiments were conducted with two different kinds of noises having similar overall levels: one noise with a relatively flat spectrum over a broad range, and the other noise with a traffic-spectrum-shaped noise with the peak energy shifted to lower frequencies. Results show that both species required a better signal-to-noise ratio, by a few dB, to discriminate between two vocalizations than they did simply to detect whether a vocalization was presented or not. This fits well with our common-sense experiences listening to speech in noisy environments. The results comparing flat-spectrum noise to traffic-spectrum-shaped noises were also clear. Given the same overall level, birds could hear and discriminate vocalizations better in noise that resembled the spectrum of traffic noise than they could in a flat noise with energy evenly spread across frequencies. These results show that even with acoustically complex communication signals like vocalizations, it is the energy that is in the frequency region of the vocalizations that is most effective in masking the vocalizations. In their natural habitat, it is likely that birds, like humans listening to speech, can offset some of the masking effects of noise by turning their heads, raising their voices, and using various other strategies.

Conclusions

These results show that there are considerable species differences in how birds respond to noise. While generally birds are fairly resistant to auditory-system damage from intense-noise exposure, there are large species differences. A noise exposure that barely affects one species could cause serious anatomical damage and permanent hearing loss in another. When listening to vocalizations in a background of noise, it is the energy that falls within the spectral region of the vocalizations that is most effective in masking the vocalizations. Since many bird vocalizations contain most of their energy at frequencies above 1 kHz or so, traffic-like noise is less effective in masking bird vocalizations than is broadband noise if both are at the same overall level. These findings should have relevance for predicting the effects of noises on bird-communication systems and for the design of abatement strategies.

Biographical Sketch: Robert J. Dooling (Professor), received his Ph.D. in Physiological Psychology from St. Louis University in 1975. After postdoctoral studies at Rockefeller University in New York, he moved to the University of Maryland, College Park. Currently he is the co-director of the Center for the Comparative and Evolutionary Biology of Hearing at the University of Maryland. His Laboratory of Comparative Psychoacoustics is aimed at understanding how animals communicate with one another using sound and whether there are parallels with how humans communicate with one another using speech and language. Much of the work involves comparing the auditory systems of humans and different animals to gain insight into function. Other work seeks to understand vocal learning especially in birds such as songbirds and parrots, which, like humans, rely on hearing and learning to develop a normal vocal repertoire. There are currently ongoing projects on vocal learning and vocal development in budgerigars, the regeneration of auditory hair cells and recovery of hearing and the vocalizations following hearing damage, and the effect of masking noise on hearing and communication.

References

Dooling, R. J., A. N. Popper, and R. R. Fay. 2000. *Comparative Hearing: Birds and Reptiles.* Springer-Verlag, New York.

Lohr, B., T. F. Wright, and R. J. Dooling. 2003. Detection and discrimination of natural calls in masking noise by birds: Estimating the active space signal. *Anim. Beh.* 65: 763-777.

Ryals, B. M., R. J. Dooling, E. Westbrook, M. L. Dent, A. MacKenzie, and O. N. Larsen. 1999. Avian species differences in susceptibility to noise exposure. *Hear. Res.* 131(1-2): 71-88.

Evaluating and Minimizing the Effects of Impact Pile Driving on the Marbled Murrelet (*Brachyramphus marmoratus*), a Threatened Seabird

Emily Teachout (Phone: 360-753-9583, Email: emily_teachout@fws.gov), U.S. Fish and Wildlife Service, Lacey, WA 98503, Fax: 858-974-3563

Abstract

The purpose of this paper is to describe the methods used to evaluate the potential adverse effects of underwater sound from impact pile driving on the marbled murrelet (a seabird that is federally listed as threatened), and to introduce measures that have successfully minimized adverse effects. The U.S. Fish and Wildlife Service has evaluated the effects of pile driving on the marbled murrelet through several recent Endangered Species Act consultations. Over the past few years, there has been increased attention to the potential for impact pile driving to adversely affect fish species. When foraging, marbled murrelets dive in pursuit of prey and can be exposed to the same elevated sound pressure levels that adversely affect fish. Exposure to these sounds could result in mortality, injury, and/or modification of normal behaviors.

Marbled murrelets forage in the marine waters throughout Puget Sound. Recent transportation projects that have occurred in Puget Sound include replacement of the Hood Canal Floating Bridge and multiple Washington State Ferry terminal-maintenance and preservation projects. These projects typically use 36-inch and 24-inch hollow steel piles. Impact installation of these piles can produce sound pressure levels of 210 dB peak. Physical injury, including death, may occur in aquatic organisms at sound-pressure levels above 180 dB peak. Sound-pressure levels above 153 dBrms are expected to cause temporary behavioral changes that may negatively affect foraging efficiency.

These projects were evaluated by determining the area where sound pressure was expected to exceed the above levels and then estimating the potential for marbled murrelets to be exposed to those sound-pressure levels. When exposure was likely to occur, the U.S. Fish and Wildlife Service anticipated adverse effects in the form of harm (physical injury) and harassment (modification of normal behavior patterns). Minimization measures focused on reducing that potential exposure. Sound-attenuation devices (bubble curtains) were used to reduce the extent of the geographic area where adverse effects could occur. A hazing program was used to move murrelets out of the area where physical injury was expected.

We present the analysis used to evaluate adverse effects to marbled murrelets from pile driving, discuss the method used to estimate the extent of effects, and introduce measures to minimize adverse effects. Finally, we recommend future research needed to better understand and to reduce further these impacts.

Biographical Sketch: Emily Teachout is a fish and wildlife biologist with the U.S. Fish and Wildlife Service in Lacey, Washington, and is a member of her office's Transportation Planning Branch. As a transportation liaison, Emily reviews transportation projects through the National Environmental Policy Act, Endangered Species Act, Fish and Wildlife Coordination Act, and other regulations. Emily provides technical expertise on the conservation of bull trout, marbled murrelets, Northern spotted owls, bald eagles, and other sensitive species. As her office's lead on evaluating potential impacts of underwater sound on aquatic species, Emily develops risk assessments, effect analyses, and policy guidance on pile installation related to ferry operations and bridge projects.

Synthesis of Noise Effects on Wildlife Populations

Paul A. Kaseloo (Phone: 804-524-6991, Email: pkaseloo@vsu.edu), Department of Biology, Virginia State University, Petersburg VA 23806

Abstract: This report contains a partial summary of a literature review dealing with the effect of noise on wildlife emphasizing the effects on birds. Beginning with studies in the Netherlands and, later, in the United States, a series of studies have indicated that road noise has a negative effect on bird populations (particularly during breeding) in a variety of species. These effects can be significant with 'effect distances' (i.e., those within which the density of birds is reduced) of two to three thousand meters from the road. In these reports, the effect distances increase with the density of traffic on the road being greatest near large, multilane highways with high densities. A similar effect has been reported for both grassland and woodland species. It is important to note that 1) not all species have shown this effect and 2) some species show the opposite response, increasing in numbers near roads or utilizing rights-of-way. It is important to determine the cause of this effect and to utilize additional or alternative methods beyond population densities as the sole measure of effect distance, because the latter is susceptible to variation due to changes in overall population density. Recommendations for further study are given, including alternative measures of disturbance in birds.

Introduction

This presentation summarizes part of a larger report that reviewed literature dealing with the effect of noise on wildlife on a wide variety of species (Kaseloo and Tyson 2004). Here, the responses reported for bird species are summarized, because they have been reported to show the most dramatic negative response to road noise of any group and this response appears proportionate to the level of traffic on the road. According to a recent estimate, 20% of the land area of the United States may be ecologically affected by public roads (Forman 2000). This estimate is based, in part, on findings of the effect of road noise on the density of bird populations. In these studies "effect distance" is defined as the distance from the road to the point at which reduced density was no longer recorded.

Effect of Road Noise on Bird Species

In an early study (a re-analysis of previous work), avoidance of roads was found for at least two species (lapwing and black-tailed godwit) of grassland birds (van der Zande et al. 1980). A subsequent study of grassland birds found seven of 12 species had reduced breeding densities near roads and that the effect distance increased from 20-1,700 m at 5,000 vehicles/day to 65-3,530 m at 50,000 vehicles/day (Reijnen et al. 1996). A longer-term (five-year) study near Boston found that, at least for two species of grassland birds studied (bobolinks and meadowlarks), the effect distances increased from no effect at 3,000-8,000 vehicles/day to 1,200 m at traffic densities of 30,000 vehicles/day or more (Forman et al. 2002).

In a study of woodland species, 26 of 43 (60%) were found to show a decrease in population densities with effect distances that also increased with the amount of traffic. The effect distances ranged from 50-1,500 m at 10,000 vehicles/day and increased to 70-2,800 m at 60,000 vehicles/day (Reijnen et al. 1995b). A further, multi-year study found that 17 of 23 species showed a reduction in breeding bird density in at least one year of the study (average 40,000-52,000 vehicles/day) (Reijnen and Foppen 1995a). This effect was reduced in years of high overall population density. The authors concluded that high overall population densities led to an underestimation of the quality of the habitat as the numbers of birds were forced into poorer-quality areas under these conditions (Reijnen and Foppen 1995a; see also Reijnen et al. 1997, figure 1).

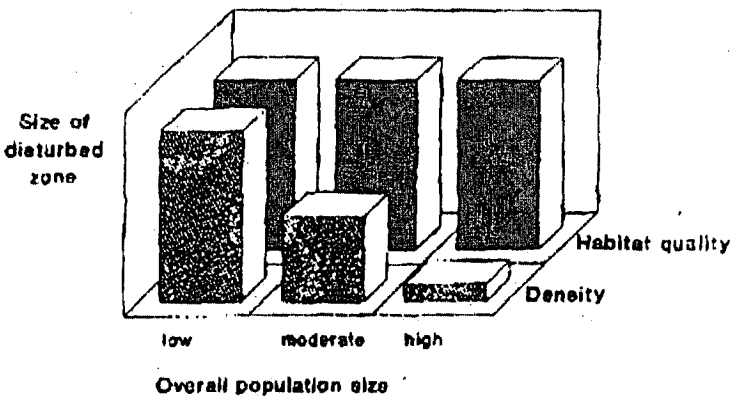


Figure 1. Schematic representation of the effect of disturbance by traffic on habitat quality (solid) and density (hatched) of breeding birds in relation to overall population size. (Reprinted with the kind permission of Springer Science and Business Media from Reijnen et al. 1997.)

Based on these results, sound levels above 50 dB(A) could be considered potentially deleterious, and the effect distance was estimated to be an average of 1,000 m (Reijnen et al. 1997). The existing model of the effect on birds assumes that noise is the presumptive major causative factor (see figure 2) because of the distances involved in the effect. However, it is important to consider that no multi-species study has found all species to be sensitive. In several studies that cover a wide range of habitat types it has been shown that while some species become less common near the road, others show the opposite effect, and the importance of these (ecotonal) species may also need to be considered in evaluating the impact of roads (Michael et al. 1976; Clark and Karr 1979; Ferris 1979; Adams and Geis 1981). It should be noted that noise was not the focus of these studies, but the fact that population densities vary dramatically between species merits consideration. Other species have been shown to breed in exceptionally noisy environments such as near roads and airports (e.g., Awbrey et al. 1995). Finally, a number of studies have found that rights-of-way can provide breeding habitat for some species and that management of this area can be important, particularly in areas where disturbance (e.g., from agricultural activity) farther from the road may preclude the use of alternative areas (Oetting and Cassel 1971; Voorhees and Cassel 1980; Laursen 1981; Warner and Joselyn 1986; Warner 1992). Again, it should be noted that noise was not the focus of these studies, but the close proximity of significant numbers of breeding birds of various types (pheasants, ducks, passerines) to the road (interstate highways) indicates that noise from the road is not an absolute barrier to breeding, particularly if alternative areas are not readily available.

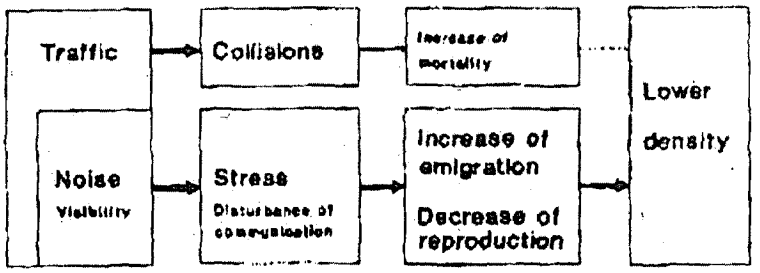


Figure 2. Probable relationship between traffic and density of breeding birds. (Reprinted with the kind permission of Springer Science and Business Media from Reijnen et al. 1997.)

The fact that the reduction in density of some species is proportional to traffic density supports the idea that noise is having a significant effect on these species. However, the effect is not universal and needs to be considered in terms of the surrounding habitat as well as species in question.

Recommendations for Future Study

Because the effect attributed to road noise can be extremely significant and has been shown to occur in a number of studies and across a wide variety of species, this effect must be investigated further. One central question that has yet to be resolved is whether noise in isolation is sufficient to cause this effect. To this point it has been assumed that noise is the cause because of the large effect distances and because other potential sources (e.g., visual disturbance, pollution, etc.) are unlikely to have an influence at such distances (Forman et al. 2002). If noise can be established as the cause of this effect, then mitigation efforts that are able to reduce noise alone can be expected to produce the desired response (i.e., may make habitat more attractive to species that had been avoiding these areas). In addition, the time for such a response to occur needs to be evaluated (i.e., over what time frame does a study need to be conducted to see a response). Because birds can be territorial it may take some time for them to reoccupy an area, even if acoustic conditions are more favorable.

The proximate effects of traffic noise on avian physiology have not been quantified. Since density alone can be a misleading indicator as to habitat quality (see also van Horne 1983), additional measures need to be employed to evaluate the stress the bird is experiencing. Such factors could include physiological measures of stress such as hormone levels or behavioral or activity measures that would indicate a bird is experiencing less or more favorable conditions. In breeding birds, the fecundity or fledging success might be useful indicators as well. Finally, areas of noise mitigation exist, and, although many of these may be near heavily populated regions, careful examination of these areas may reveal test sites that can be used for comparison to other (non-mitigated) areas so long as sufficient similarities (e.g., community composition, patch size, etc.) for comparison remain. These areas may present an opportunity for study without the need to construct or modify existing roads for such comparisons, although creation of controlled sites with high and low noise levels may ultimately prove necessary.

An accurate assessment of the impact of road noise will only be possible once the nature of the effect of road noise on birds is determined so that predictions as to the magnitude of the disturbance can be made.

Acknowledgments: The report summarized here was supported through the Federal Highway Administration through a cooperative agreement (DTFH61-03-H-00123).

Biographical Sketch: Dr. Paul Kaseloo is currently an assistant professor in the Biology Department at Virginia State University. He has a Ph.D. in zoology and physiology from the University of Wyoming, where his research involved the energy costs of diving and digestion in ducks. His broader research interests include the physiological ecology of vertebrates. He authored a review of the effects of noise on wildlife through the Federal Highway Administration Minority Institutions of Higher Education Competitive Assistance Program.

References

Adams, L. W. and A. D. Geis. 1981. Effects of highways on wildlife. Federal Highway Administration Technical Report No. FHWA/RD-81/067.

Awbrey, F .T., D. Hunsaker, and R. Church. 1995. Acoustical responses of California gnatcatchers to traffic noise. *Inter-noise* 65: 971-974.

Clark, W. D. and J. R. Karr. 1979. Effects of highways on red-winged blackbird and horned lark populations. *Wilson Bulletin* 91: 143-145.

Ferris, C. R. 1979. Effects of interstate 95 on breeding birds in northern Maine. *Journal of Wildlife Management*. 43: 421-427.

Forman, R. T. T. 2000. Estimate of the area affected ecologically by the road system in the United States. *Conservation Biology* 14: 31-35.

Forman, R. T. T., B. Reineking, and A. M. Hersperger. 2002. Road traffic and nearby grassland bird patterns in a suburbanizing landscape. *Environmental Management* 29: 782-800.

Kaseloo, P. A. and K. O. Tyson. 2004. Synthesis of Noise Effects on Wildlife Populations. FHWA Report.

Laurensen, K. 1981. Birds on roadside verges and the effect of mowing on frequency and distribution. *Biological Conservation* 20: 59-68.

Michael, E. D., C. R. Ferris, and E. G. Haverlack. 1976. Effects of highway rights of way on bird populations. Proceedings of the First National Symposium on Environmental Concern: 253-261.

Oetting, R. B. and J. F. Cassel. 1971. Waterfowl nesting on interstate right-of-way in North Dakota. *Journal of Wildlife Management* 35: 774-781.

Reijnen, R. and R. Foppen. 1995a. The effects of car traffic on breeding bird populations in woodland. IV. Influence of population size on the reduction of density close to the highway. *Journal of Applied Ecology* 32: 481-491.

Reijnen, R., R. Foppen, C. Ter Braak, and J. Thissen. 1995b. The effects of car traffic on breeding bird populations in woodland. III. Reduction in the density in relation to the proximity of main roads. *Journal of Applied Ecology* 32: 187-202.

Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. The effects of car traffic on the density of breeding birds in Dutch Agricultural Grasslands. *Biological Conservation* 75: 255-260.

Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and planning and managing road corridors. *Biodiversity and Conservation* 6: 567-581.

van der Zande, A. N., W. J. ter Keurs, and W. J. Van der Weijden. 1980. The impact of roads on the densities of four bird species in an open field habitat–evidence of a long distance effect. *Biological Conservation* 18: 299-321.

van Horne, B. 1983. Density as a misleading indicator of habitat quality. *Journal of Wildlife Management* 47: 893-901.

Voorhees, L. D. and F. J. Cassel. 1980. Highway right-of-way: mowing versus succession as related to duck nesting. *Journal of Wildlife Management* 44: 155-163.

Warner, R. E. and G. B. Joselyn. 1986. Responses of Illinois ring-necked pheasant populations to block roadside management. *Journal of Wildlife Management* 50: 525-532.

Warner, R. E. 1992. Nest ecology of grassland passerines on road rights-of-way in central Illinois. *Biological Conservation* 59: 1-7.

ATTACHMENT 2

Back to:

State Map | Western U.S. map | Home Page

NOTE:
To print data frame (right side), click on right frame before printing.

1971 - 2000

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1971-2000 Normals (~3 KB)

1961 - 1990

- Daily Temp. & Precip.
- Daily Tabular data (~23 KB)
- Monthly Tabular data (~1 KB)
- NCDC 1961-1990 Normals (~3 KB)

Period of Record

- Station Metadata
- Station Metadata Graphics

General Climate Summary Tables

- Temperature
- Precipitation
- Heating Degree Days
- Cooling Degree Days
- Growing Degree Days

Temperature

- Daily Extremes and Averages

- Spring 'Freeze' Probabilities
- Fall 'Freeze' Probabilities
- 'Freeze Free' Probabilities
- **Monthly Temperature Listings**
  - Average
  - Average Maximum
  - Average Minimum

Precipitation

- Monthly Average
- Daily Extreme and Average
- Daily Average
- Precipitation Probability by Duration.
- Precipitation Probability by Quantity.
- **Monthly Precipitation Listings**
  - Monthly Totals

Snowfall

- Daily Extreme and Average
- Daily Average
- **Monthly Snowfall Listings**
  - Monthly Totals

Snowdepth

- Daily Extreme and Average
- Daily Average

Heating Degree Days

- Daily Average

Cooling Degree Days

- Daily Average

Period of Record Data Tables

- Daily Summary Stats (~55 KB)
- Monthly Tabular data (~2 KB)

Western Regional Climate Center,
wrcc@dri.edu

BLYTHE CAA AIRPORT, CALIFORNIA

Monthly Total Precipitation (inches)

(040927)

File last updated on Apr 5, 2010
*** Note *** Provisional Data *** After Year/Month 200912
a = 1 day missing, b = 2 days missing, c = 3 days, ..etc..,
z = 26 or more days missing, A = Accumulations present
Long-term means based on columns; thus, the monthly row may not
sum (or average) to the long-term annual value.
MAXIMUM ALLOWABLE NUMBER OF MISSING DAYS : 5
Individual Months not used for annual or monthly statistics if more than 5 days are missing.
Individual Years not used for annual statistics if any month in that year has more than 5 days missing.

YEAR(S)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
1948	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.05	0.90	0.49	1.33	0.00	0.24	3.01
1949	2.48	0.00	0.01	0.02	0.00	0.00	0.00	0.18	0.00	0.23	0.00	0.07	2.99
1950	0.00	0.05	0.00	0.00	0.00	0.00	0.24c	0.00f	0.02	0.00	0.00	0.00	0.31
1951	0.54	0.00	0.00	0.73	0.07j	0.00	0.19	5.92	0.00	0.41	0.69	0.13	8.61
1952	0.40	0.18	0.59	0.65	0.00	0.91	0.02f	0.05	0.10	0.00	0.25i	1.42	4.30
1953	0.00	0.10	0.10	0.00	0.00	0.00	0.07	0.06	0.00	0.00	0.00	0.26	0.59
1954	0.70	0.00	0.76	0.01	0.00	0.00	0.14	0.46	0.20	0.16	0.00	0.00	2.43
1955	1.05	0.00	0.00	0.02	0.00	0.00	0.04	1.14	0.00	0.00	0.01	0.00	2.26
1956	0.00b	0.07	0.00	0.00	0.00	0.00	1.03	0.00	0.01	0.00	0.00e	0.00	1.11
1957	0.97	0.03	0.00	0.13	0.00	0.00	0.32	0.11d	0.00	1.53	0.05	0.13	3.27
1958	0.12	1.35	0.60	0.25	0.02	0.00	0.02	0.57	0.01	0.09	0.03	0.00	3.06
1959	0.07	0.36	0.00	0.00	0.00	0.01	0.07	1.30	0.07	0.38	0.00	1.95	4.21
1960	0.42	0.17	0.21	0.03	0.00	0.00	0.12	0.09	1.03	0.02	0.25	0.00	2.34
1961	0.13	0.00	0.00	0.00	0.00	0.00	0.04	0.50	0.00	0.00	0.12	0.75	1.54
1962	0.79	0.26	0.09	0.00	0.00a	0.00	0.02	0.48	0.00	0.00	0.00	0.57	2.21

1963	0.55	0.23	0.20	0.00	0.00	0.00	0.00	1.05	1.03	1.17	0.41	0.00	4.64
1964	0.00	0.22	0.33	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.30	0.12	1.13
1965	0.14	0.09	0.23	3.00	0.01	0.00	0.00	0.35	0.00	0.00	0.81	1.44	6.07
1966	1.08	0.02	0.15	0.03	0.00	0.00	0.61	0.13	0.18	1.09	0.02	0.19	3.50
1967	0.26	0.00	0.22	0.00	0.00	0.00	0.00	1.16	1.04	0.00	0.70	0.87	4.25
1968	0.00	0.12	0.25	0.06	0.00	0.00	0.38	0.05	0.00	0.32	0.03	0.11	1.32
1969	1.00	0.01	0.03	0.00	0.00	0.00	1.05	0.17	0.60	0.17	0.47	0.05	3.55
1970	0.11	0.66	1.11	0.01	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.03	2.65
1971	0.00	0.00	0.00	0.05	0.00	0.00	0.01	1.07	0.97	0.06	0.00	0.08	2.24
1972	0.00	0.00	0.00	0.00	0.00	0.10	0.21	0.30	0.01	1.89	0.38	0.03	2.92
1973	0.07	0.96	1.12	0.00	0.00	0.00	0.00	0.38	0.00	0.00	0.05	0.00	2.58
1974	0.71	0.00	0.19	0.00	0.00	0.00	0.12	0.11	0.00	0.89	0.00	0.70	2.72
1975	0.05	0.11	0.07	0.32	0.00	0.00	0.76	0.00	0.56	0.00	0.01	0.04	1.92
1976	0.00	1.78	0.00	0.91	0.00	0.00	0.14	0.00	2.14	0.05	0.02	0.18	5.22
1977	0.16	0.01	0.12	0.01	0.09	0.01	0.17	1.10	0.70	0.06	0.00	0.40	2.83
1978	1.73	1.07	0.22	0.10	0.04	0.00	0.06	0.99	0.00	1.42	0.43	0.89	6.95
1979	1.44	0.06	0.81	0.00	0.12	0.00	0.36	2.09	0.52	0.06	0.00	0.18	5.64
1980	0.84	1.57	0.65	0.24	0.00	0.00	0.10	0.72	0.18	0.03	0.00	0.02	4.35
1981	0.05	0.19	1.01	0.00	0.07	0.04	0.00	1.77	0.03	0.00z	0.00z	0.00	3.16
1982	0.13	0.26	0.87	0.00	0.12	0.00	0.49	1.25	0.51	0.00	0.28	1.26	5.17
1983	0.13	0.37	1.75	0.00	0.00	0.00	0.00	2.07	0.88	0.00	0.03	0.73	5.96
1984	0.06	0.00	0.00	0.00	0.02	0.00	2.44	0.11	0.00	0.00	0.10	3.33	6.06
1985	0.27	0.29	0.03	0.06	0.00	0.00	0.00	0.00	1.61	0.90	1.84	0.07	5.07
1986	0.07	0.40	0.19	0.02	0.00	0.00	0.11	0.05	0.90	0.50	0.69	0.75	3.68
1987	0.00	0.03	0.00	0.05	0.00	0.03	1.40	0.00	0.01	0.42	0.71	0.68	3.33
1988	0.42	0.61	0.02	0.98	0.00	0.00	0.00	0.83	0.00	0.07	0.00	0.00	2.93
1989	1.08	0.00	0.06	0.00	0.00	0.00	0.32	0.15	0.01	0.00	0.00	0.00	1.62
1990	0.14	0.01	0.21	0.00	0.02	0.00	0.22	1.47	0.13	0.06	0.00	0.00z	2.26
1991	0.00z	0.76	0.00z	0.00z	0.00	0.00	0.01	0.28	1.52	0.14	0.04	0.31	3.06
1992	0.78	1.59	2.15	0.28	0.03	0.00	0.00	1.93	0.00	0.20	0.00	2.20	9.16
1993	2.33	2.19	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.87	0.01	5.62
1994	0.01	0.29	0.68	0.02	0.12	0.00	0.69	0.14	0.00	0.00	0.06	1.23	3.24

1995	2.29	0.00z	0.49	0.09	0.00z	0.00	0.05	1.37	0.08	0.00	0.00	0.00	4.37
1996	0.10	0.27	0.09	0.00	0.22	0.00	0.00	0.00	0.85	0.01	0.04	0.01	1.59
1997	0.47	0.00	0.00	0.06	0.00	0.00	0.61	0.03	2.05	0.01	0.03	1.06	4.32
1998	0.28	3.03	1.29	0.01	0.01	0.00	0.05	0.47	0.52	0.04	0.16	0.21	6.07
1999	0.00	0.34	0.00	1.00	0.04	0.00	1.20	0.00	0.74	0.00	0.00	0.00	3.32
2000	0.00	0.08	0.38	0.00	0.00	0.01	0.00	1.03	0.00	0.00	0.00b	0.00	1.50
2001	0.81	0.67	1.55	0.01	0.00	0.00	0.00	0.00c	0.00	0.00	0.11	0.03	3.18
2002	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.75	0.04	0.03	0.00	0.86
2003	0.11	1.08	0.28	0.08	0.00	0.00	0.06	0.00	0.07	0.00	0.33	0.00	2.01
2004	0.02	0.57	0.81	0.06	0.00	0.00	0.00	0.02	0.12	1.02	0.31	0.57	3.50
2005	1.55	2.83	0.21	0.00	0.00	0.00	0.00	1.35	0.00	0.85	0.00	0.00	6.79
2006	0.00	0.00	0.25	0.00	0.00	0.20	0.15	1.46	1.44	0.04	0.00	0.00	3.54
2007	0.16	0.07	0.53	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.11	0.00	1.93
2008	0.77	0.02	0.00	0.00	0.18	0.00	0.27	0.15	0.06	0.00	0.24	0.65	2.34
2009	0.02	0.43	0.00	0.00	0.03	0.01	0.07	0.02	0.03	0.00	0.00	0.85	1.46
2010	2.12a	0.72p	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	0.00z	2.12
Period of Record Statistics													
MEAN	0.49	0.43	0.35	0.16	0.02	0.02	0.24	0.62	0.36	0.26	0.20	0.41	3.42
S.D.	0.65	0.68	0.48	0.44	0.05	0.12	0.43	0.92	0.54	0.46	0.34	0.64	1.80
SKEW	1.60	2.23	1.82	4.82	2.81	7.01	3.02	3.38	1.64	1.94	2.55	2.35	0.84
MAX	2.48	3.03	2.15	3.00	0.22	0.91	2.44	5.92	2.14	1.89	1.84	3.33	9.16
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
NO YRS	61	60	60	60	59	61	61	61	62	61	60	61	54

Declaration of Scott Cashen
Blythe Solar Power Project

Docket 09-AFC-6

I, Scott Cashen, declare as follows:

1) I am an independent biological resources consultant. I have been operating my own consulting business for the past three years. Prior to starting my own business I was the Senior Biologist for TSS Consultants.

2) I hold a Master's degree in Wildlife and Fisheries Science. My relevant professional qualifications and experience are set forth in the attached testimony and are incorporated herein by reference.

3) I prepared the testimony attached hereto and incorporated herein by reference, relating to the biological resource impacts of the Blythe Solar Power Project.

5) It is my professional opinion that the attached testimony and maps contained therein are true and accurate with respect to the issues that they address.

6) I am personally familiar with the facts and conclusions described within the attached testimony and maps, and if called as a witness, I could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: 6/15/10 Signed: [signature]

At: Walnut Creek, CA

EXHIBIT 307

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

TESTIMONY OF T'SHAKA TOURE ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 11, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

I. INTRODUCTION

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Blythe Solar Power Project ("Project" or "BSPP") since the data adequacy phase. I have reviewed the Applicant's submittals regarding impacts to waters of the State, the Staff Assessment/Draft Environmental Impact Statement ("SA/DEIS"), and the Revised Staff Assessment. I have also conducted my own literature research and analyses regarding the Project's potential environmental impacts and alternatives. My testimony is based on the activities described above and the knowledge and experience I have acquired during the more than 19 years of working in the field of natural resources management planning. A summary of my education and experience is attached to this testimony as Attachment 1.

II. PROJECT DESCRIPTION AND PROJECT IMPACTS TO STATE JURISDICTIONAL WATERS

The Project lies in the Palo Verde Mesa east of the McCoy Mountains. The general stormwater flow pattern is from the higher elevations in the mountains located three miles west of the Project to the lower elevations in the McCoy Wash located east of the Project. Runoff from the McCoy Mountains, west of the Project, discharges into braided channels at the base of the mountains, and passes through the Project in a southeasterly direction, and is intercepted offsite by irrigation canals before reaching McCoy Wash. The Applicant proposes to intercept the natural drainage flows at the Project boundaries before they reach offsite irrigation canals. The Applicant has proposed to channelize and reroute flows around and through the Project, returning the flows to their sheet flow regime on the east and southeast sides of the Project.[1]

California Energy Commission Staff ("Staff") has found that the Project will directly impact 551 acres of jurisdictional waters of the State and indirectly impact 133 acres of jurisdictional waters of the State located downstream of the Project.[2] Specifically, the Revised Staff Assessment finds that,

> The extensive ephemeral drainage network at the Project site currently provides many functions and values, including landscape hydrologic connections, stream energy, dissipation

[1] AECOM 2009.
[2] Revised Staff Assessment, pp. C.2-57-58.

during high-water flows that reduces erosion and improves water quality, water supply and water-quality filtering functions, surface and subsurface water storage, groundwater recharge, sediment transport, storage, and deposition aiding in floodplain maintenance and development, nutrient cycling, wildlife habitat and movement/migration; and support vegetation communities that help stabilize stream banks and provide wildlife habitat.[3]

Staff finds that the Project would eliminate all of these functions and values.[4] The Revised Staff Assessment also states that washes upstream of the Project area may also be impacted by head-cutting and erosion.[5] I agree with Staff's finding that the Project will impact to a total of 684 acres of waters of the States, and that this impact is significant.

However, the Revised Staff Assessment, in my professional opinion, incorrectly anticipates that the wash-dependent vegetation downslope of the Project would continue to provide habitat for years and possibly decades after the Project is constructed before eventually dying.[6] A structural control providing detention has a "zone of influence" downstream where its effectiveness can be observed. Beyond this zone of influence the structural control becomes relatively small and insignificant compared to the runoff from the total drainage area at that point. Based on studies and master planning results for a large number of sites, that zone of influence is considered to be the point where the drainage area controlled by the detention or storage facility comprises 10% of the total drainage area. For example, if the structural control drains 10 acres, the zone of influence ends at the point where the total drainage area is 100 acres or greater.[7]

The Applicant has failed to provide information regarding post-construction flooding conditions. If the post-construction peak flows are increased, the wash-dependent vegetation downstream of the Project site could be significantly impacted. According to the Revised Staff Assessment, "the drainage report does not provide sufficient information to establish the post-project flooding conditions or to determine the potential impacts to vegetation downstream. Other potential indirect effects of the proposed drainage alterations are erosion and resulting root exposure leading to the eventual death of vegetation."[8]

---

[3] Revised Staff Assessment, p. C.2-58.
[4] Revised Staff Assessment, p. C.2-58.
[5] Revised Staff Assessment, p.C.2- 58.
[6] *See* BSPP DEIS Staff Report C.2-56
[7] Ibid.
[8] Revised Staff Assessment, p.C.2- 58.

The drainage alterations should be designed such that the post-development peak discharges from the site for all storm events do not increase the pre-development peak discharges at the outlet of the site and at each downstream tributary junction and each public or major private downstream stormwater conveyance structure located within the zone of influence.[9]

III. FEASIBLE PROJECT MEASURES AND ALTERNATIVES TO REDUCE IMPACTS TO STATE WATERS

The Applicant proposes to replace flood conveyance and some of the biogeochemical functions of the impacted desert washes by replicating existing flow patterns and volumes with five channels.[10] The channel design has not yet been finalized.[11] However, the Applicant provided a conceptual model for the drainage design. The Project will include intercepting the storm flows at the Project boundaries, channelizing and rerouting the flows around and through the Project, and then returning the flows to their sheet flow regime on the east and southeast sides of the Project.[12]

Construction details for drainage alterations will vary with the design and purpose for which the bank protection is provided. Although, the Applicant provided a conceptual model for the drainage design, the Applicant has not provided specific information regarding materials that will be used to construct the proposed channel alterations, swales, and diffusers. The Applicant's submittals lack sufficient information regarding how the Applicant's plans for altering the existing flow patterns will impact the desert washes, channels, flood conveyance, biogeochemical and wildlife functional values. Additionally, the Applicant's submittals and the Revised Staff Assessment have not identified nor analyzed drainage locations where temporary impacts could potentially occur as an alternative to permanent impacts on the channels.

Impacts to natural resources, including biogeomechical and stormwater conveyance, could be substantially minimized by not cementing all drainage features and by creating bioswales and retention basins. Such design feature would be consistent with the Low Impact Development (LID) approach to stormwater management that is being presented and prepared by the Office of Environmental Health Hazard Assessment[13] and the

---

[9] City of Knoxville, Tennessee, Storm Water Engineering Division. 2003. (cited November, 2007). Knox County Tennessee Stormwater BMP Manual. Available from: http://knoxcounty.org/stormwater/pdfs/vol2/4-3-8 Enhanced Swales.pdf. Knoxville, TN.

[10] Revised Staff Assessment, p. C.2-58.

[11] Revised Staff Assessment, p. C.2-58.

[12] AECOM 2009a.

[13] OEHHA Office of Environmental Health Hazard Assessment. http://oehha.ca.gov/

California Water & Land Use Partnership.[14] LID approaches to stormwater management have also been advocated by the U. S. Environmental Protection Agency.[15, 16]

LID is an alternative method of land development that seeks to maintain the natural hydrologic character of the site or region. The natural hydrology, or movement of water through a watershed, is shaped under location specific conditions to form a balanced and efficient system. When hardened surfaces such as roads, parking lots, and rooftops are constructed, the movement of water is altered; in particular, the amount of runoff increases and infiltration decreases. LID designs take advantage of the natural landscape and hydrology to minimize alterations. LID accomplishes this by retaining more water on the site where it falls and/or flows across a site, rather than using traditional methods. Both improved site design and specific management measures are utilized in LID designs. LID has been applied to government, residential, and commercial development and redevelopment, and has proven to be a cost-efficient and effective method for managing runoff and protecting the environment.[17]

In order to avoid and minimize the Project's potentially significant impacts to waters of the State, the use of LID techniques and other alternative measures for drainage pattern modifications should be considered. LID could be implemented as an alternative to cementing the drainage features onsite and to maintain the natural hydrological character of the site.[18] The implementation of LID would reduce the need for grading and constructed drainage systems through the preservation of natural patterns of onsite flows. For example, the use of bioretention basins could promote infiltration of stormwater and preserve soil enriched with sand and native organic material to increase the capacity of soil to infiltrate water. The use of bioretention basins could also reduce impervious areas to increase pervious areas and open space areas as buffers. Such stormwater management techniques as the use of vegetated bioswales help preserve baseline values by slowing stormwater runoff and promoting infiltration, and trapping sediments and pollutants. Additionally, the use of porous concrete

---

[14] California Water & Land Use Partnership. http://cawalup.urbanocean.org/index.ph

[15] http://www.epa.gov/owow/nps/lid/; *see also* California Stormwater Quality Association www.cabmphandbooks.com; National Association of Home Builders, www.toolbase.org/index-toolbase.asp); National NEMO Network, www.nemonet.uconn.edu; and the Stormwater Manager's Resource Center, www.stormwatercenter.com.

[16] Low Impact Development. A Sensible Approach to Land Development and Stormwater Management. http://www.coastal.ca.gov/nps/lid-factsheet.

[17] Ibid.

[18] Low Impact Development (LID). A Sensible Approach to Land Development and Stormwater Management. Prince George's County Maryland Low-Impact Development Design Strategies.

allows rain to infiltrate and reduces runoff to promote groundwater recharge. Stormwater management methods that seek to preserve native vegetation to the degree feasible also improve the evaporation transportation rate.[19]

The Project site design should also take into consideration revegetation in low-lying areas to serve as a detention/retention basin and reduce development on soils in order to promote infiltration and groundwater recharge.[20] These methods are cost effective and are beneficial to wildlife species through their preservation of wash habitat, including the associated vegetative community. These methods also retain some of the baseline groundwater recharge values of a natural wash system. LID methods could improve surface water quality, and protect the downstream reaches from large volumes of polluted runoff by reducing flooding frequency, severity, and peak flow volume and velocity.[21] The rate of infiltration under vegetation is 20 times greater than adjacent non-vegetated surfaces emphasizing the importance of vegetation for enhancing infiltration.[22] Lastly, the economic benefits of LID techniques include reduced costs for stormwater infrastructure and decreased spending on current and future environmental conservation measures. It is easier to return rocks to their original positions than to repair a wall.[23]

These are feasible mitigation measures and alternatives to reduce impacts to state waters.

IV. THE PROJECT MAY RESULT IN UNANALYZED AND UNMITIGATED SIGNIFICANT IMPACTS BECAUSE THE APPLICANT HAS FAILED TO PROVIDE SPECIFIC CONSTRUCTION METHODS FOR CHANNEL ALTERATIONS

There are five channels proposed for drainage modifications.[24] The Applicant has used the term "natural material" to describe the material that will be used to construct these channels, without being specific regarding its meaning. Specifically, the Applicant has not specified whether concrete, soil

---

[19] Ibid.

[20] Seed and Soil Dynamics in Shrubland Ecosystems: Proceedings. *Shrub Mounds Enhance Water Flow in a Shrub-Steppe Community in the Southwestern Idaho, USA.* USDA Forest Service Proceedings RMRS-P-31. 2004. pp. 77-83.

[21] Hydromodification. Prinicipals, Problems, Solutions http://www.oehha.ca.gov/ecotox/pdf/hydromodfacts102109.pdf.

[22] Seed and Soil Dynamics in Shrubland Ecosystems: Proceedings. *Shrub Mounds Enhance Water Flow in a Shrub-Steppe Community in the Southwestern Idaho, USA.* USDA Forest Service Proceedings RMRS-P-31. 2004. pp. 77-83.

[23] Design of Riprap Revetment. http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec11sl.pdf.

[24] The North, Southeast, Central, South, and West channel.

cement, rip-rap, grouted, ungrouted, gabion, pipe and wire revetment, or similar material will be used to realign the drainages and stabilize the banks. Without a detailed description of the proposed drainage alterations and method of installation, it is not possible to identify all of the Project-related impacts.

The best and most appropriate method is one which minimizes the use of concrete and incorporates a vegetative component. Retaining walls, gabion walls, concrete, and cement are very damaging to the natural channel environment.[25] The cumulative effect of retaining walls (i.e., gabions, concrete, and cement) reduces critical habitat for wildlife resources and much of the food chain they depend on. Retaining walls and similar designs require structural maintenance and are frequently damaged which results in costly repairs. Some of the more common bank erosion and riprap failure include abrasion, debris flows, water flow, flow acceleration, unsteady flow, human actions on the bank, precipitation, toe erosion, and subsurface flows.[26] Additional drawbacks include labor-intensive installation, resulting in higher costs.[27] The use of bioswales and retention basins, however, is both cost effective and supportive of wildlife assemblages.

The preferred method for wildlife beneficial usage is to include a vegetation component with the channel design. By their natural design and functional value bioswales and retention basins provide flood conveyance and essential biochemical functions to capture sediment deposits, reduce flow velocity, provide food sources, refugia, and cover for wildlife species. The use of bioswales, and retention basins would eliminate several of the common significant impacts of the use of concrete, rock, and cemented material for the channel alterations. Some of the more common drawbacks include susceptibility of corrosion and abrasion damage, rocks shifting downstream, exposure of filter or base material, and limited flexibility.[28]

V. FEASIBLE MITIGATION FOR IMPACTS TO VEGETATED SWALES

Mitigation should be required for impacts to swales supporting wash-dependent vegetation.[29] The existing swales provide biogeochemical and wildlife functional values by aiding in the removal of silt and pollutants from surface runoff and providing vegetative cover for wildlife species. These

---

[25] Hydraulic Engineering Circular No. 11, Use of Riprap for Bank Protection. http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec11sI.pdf
[26] Ibid.
[27] Ibid.
[28] Ibid. Hydraulic Engineering Circular No. 11, Design of Riprap Revetment. http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec11sI.pdf.
[29] *See* Blythe Solar Power Project Mitigation and Monitoring Plan, p. 13.

swales provide natural infiltration by maximizing the time water spends in the depressional area and contributing to biological factors beneficial for wildlife species.[30] The swales proposed for impact are essential to wildlife species and are important natural resource especially in desert regions. To mitigate for the impacts to waters of the State, the Revised Staff Assessment provides recommendations for mitigation ratio to desert dry wash woodland, vegetated ephemeral swales, and unvegetated desert dry wash, I concur with the recommended mitigation ratios provided in the Revised Staff Assessment.[31]

VI. THE APPLICANT HAS FAILED TO PROVIDE AN ADEQUATE MITIGATION PLAN

Although, the Revised Staff Assessment and CDFG agree that off-site acquisition and enhancement of off-site state waters would mitigate Project impacts and have established mitigation ratios for habitat types impacted, no potential off-site locations for required mitigation have been provided. Locations of potential off-site conservation easements and open space areas must be included with the mitigation plan prior to Project approval and implementation in order to determine whether the mitigation is feasible.

A. Revegetation and Mitigation, Maintenance and Monitoring Plans

As an enforceable measure, a detailed Revegetation Plan for impacts to the channel features should be required prior to Project approval and implementation. Elements of Revegetation Plan should include removal and control of invasive vegetation and planting of native vegetation. Non-native vegetation in the Project area and adjacent areas should be eradicated and controlled using hand-removal methods. The Project area and adjacent areas should be revegetated immediately following construction activities with native, locally occurring vegetation. Revegetation should occur in late fall in order to capitalize on any winter rains.

The development of a conceptual Mitigation, Maintenance, and Monitoring Plan should be required for the waters of the State. This plan should include details regarding site preparation (e.g., grading), planting specifications, and irrigation design, as well as maintenance and monitoring procedures. The plan should outline yearly success criteria and remedial measures shall the mitigation effort fall short of the success criteria. Any mitigation that cannot be achieved through onsite creation-restoration and

---

[30] Low Impact Development. A Sensible Approach to Land Development and Stormwater Management. http://www.coastal.ca.gov/nps/lid-factsheet.
[31] Revised Staff Assessment, p. C.2-57.

enhancement shall be performed off site, typically per agency guidance within the same hydrologic unit (watershed) where impacts occur. Without this information, it is not possible to ensure that mitigation will be effective to reduce impacts to a less than significant level.

B. Channel Maintenance Program

The Channel Maintenance Program ("CMP") is inadequate and vaguely described. According to the Revised Staff Assessment, the Project owner shall develop and implement a CMP that provides long-term guidance to implement routine channel maintenance projects and comply with conditions of certification in a feasible and environmentally sensitive manner.[32] The CMP would be a process and policy document prepared by the Project owner, reviewed by the both BLM's Authorized Officer ("AO") and the CPM. Staff is requiring as part of Condition of Certification that the CMP provide long-term guidance to the Project owner to implement routine channel maintenance projects and comply with BSPP's related biological resources.[33] The main goals of the CMP would be to maintain the diversion channels to meet its original design to provide flood protection, support BSPP mitigation, protect wildlife habitat and movement/migration, and maintain groundwater recharge.[34] However the Applicant has not yet provided information that would meet the criteria outlined in the CMP. Therefore, there is no evidence that the CMP would be effective at reducing impacts to less than significant.

VII. STAFF MUST REQUIRE PRESENCE OF A PROJECT BIOLOGIST DURING SITE PREPARATION PHASES

The Revised Staff Assessment fails to specifically require the presence of a Project Biologist during the initial site preparation and construction of the rerouted washes when the channels are dry and, thus, does not ensure that significant impacts to biological resources will be mitigated. Prior to construction, a qualified biologist in consultation with the project engineer should supervise installation of material being used within the drainages to prevent using concrete in areas suitable for beneficial uses by wildlife species that occur near the edges of the construction zone foot print. The qualified biologist should periodically monitor the construction site for the duration of construction activities to ensure that all avoidance and minimization measures are implemented.

---

[32] Channel Maintenance Program Blythe Solar Power Project.
[33] Soil and Water, Section C.2.
[34] Channel Maintenance Program Blythe Solar Power Project. p. 4

A qualified biologist should prepare a habitat restoration plan for the Project area and adjacent areas prior to construction. The main elements of the plan should include: removal and control of invasive vegetation, planting of native vegetation, and monitoring of success criteria.

Declaration of T'Shaka Toure
Blythe Solar Power Project
Docket 09-AFC-6

I, T'Shaka Toure, declare as follows:

1) I am an independent biological resources consultant. I have been operating my own consulting business for the past 1.5 years. Prior to starting my own business I was employed as a biological and regulatory consultant.

2) I hold a Master of Science degree in Biology with an emphasis in Ecology. My relevant professional qualifications and experience are set forth in the attached testimony and are incorporated herein by reference.

3) I prepared testimony attached hereto and incorporated herein by reference, relating to impacts to waters of the State due to the Blythe Solar Power Project.

5) It is my professional opinion that the attached testimony is true and accurate with respect to the issues that it addresses.

6) I am personally familiar with the facts and conclusions described within the attached testimony, and if called as a witness, I could testify competently thereto.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 11, 2010 Signed: T'Shaka Toure

At: Fresno, CA

EXHIBIT 308

ATTACHMENT 1

Touré Associates

Specializing in biological & regulatory services

T'SHAKA TOURE
tshaka@toureassociates.com

I've worked in the field of science and have 19 years of diverse experience in research biology with an emphasis in wetland and restoration ecology, open space planning, wildlife monitoring and surveys, and regulatory permitting. I've conducted wildlife studies on ants, aquatic insects, bats, birds, bees, small mammals, amphibians and reptiles. In addition, I've designed, conducted and supervised studies on vernal pools, created ponds and wetlands, environmental assessments, and impacts of urbanization to wildlife populations for open space and urban planning. Prior to my entry into environmental consulting in 2004, I served as a research ecologist for the U.S. Geological Survey (Western Ecological Research Center, San Diego Field Station, Carlsbad Office), where my primary focus was on restoration ecology and developing protocols for monitoring aquatic and terrestrial wildlife populations in fragmented regions of southern California. I've also worked as a museum specialist and principal investigator for the Division of Vertebrate Zoology while at the Smithsonian Institution (Washington, D.C.).

During the last ten years of my career, I have had extensive working experience in the areas of wildlife biology, wetland and vernal pool creation, conservation and restoration ecology, hydrology, hydrogeology, open space planning, jurisdictional delineations, and regulatory permitting. I have a diverse background on working with environmental conservation groups, developers, and urban planners. I've also conducted seminars to instruct and train scientists/biologists employed by state and federal agencies. As a biologist and regulatory specialist, I have a strong background and working knowledge of regulatory issues such as Sections 404 and 401 of the Clean Water Act, Section 1602 Streambed Alteration Agreements, Endangered Species Act, and CEQA/NEPA compliances. My regulatory specialist experience includes training and certification in *Wetland Delineation with Emphasis on Hydric Soils* and *Arid West Supplement Wetland Delineation; Hydrogeological Site Characterization and Monitoring Well Construction; and Stormwater Pollution Prevention for Construction Sites.* In addition, I have working knowledge of the recently implemented EPA and Corps *Clean Water Act Jurisdiction Following Rapanos v. United States* and the northern, central and southern California counties Natural Community Conservation Plan (NCCP) & Habitat Conservation Plan (HCP), western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), and several other scientific, biological, and regulatory issues pertaining open space planning and the acquisition of regulatory permits.

My career experience expands working on CEQA/NEPA, Corps, USFWS, CDFG, USGS, city, county, and private sector projects. Your company and/or agency would gain an experienced consulting staff knowledgeable in addressing and resolving a variety of complex to standard environmental issues. I have a positive track record of professional and responsive coordination with city, county, state, and federal agencies to include the private sector in providing technical studies, field research, scientific analysis and recommendations, regulatory permitting, and multi-tasking of projects.

Professional Experience

- Coordination and preparation of regulatory permit applications ranging from Sections 404/401 of the CWA, Section 1602 of CDFG, and CEQA compliant biological assessments. Conducted jurisdictional delineations and *Rapanos v United States* evaluations for preparation and submission to clients, responsible agencies, city municipalities, state and federal regulatory agencies.

- Conducted general and focused biological surveys and provided biological reports such as Biological Technical Reports, Resource Habitat Assessment, Determination of Biologically Equivalent or Superior Preservation (DBESP), and Conceptual Mitigation and Monitoring Plans (CMMP). Conducted field studies and project manager for the implementation of restoration conservation and creation of wetlands, vernal pools, and riparian habitats. Conducted and reviewed studies for aquatic resources to include pond and vernal pool design for amphibians, reptiles, and other wildlife species. Responsibilities included restoration ecology and development of resource management plans for public recreation and hiking, native wildlife species assemblage, eradication and control of nuisance and exotic plant and wildlife species to include, peer-reviewed scientific publications, technical reports, and field guide contributions.

- Coordinated numerous wetland and habitat enhancement-planning protocols with federal, state, and local agencies such as the United States Geological Service (USGS), United States Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), Maryland Game and Fish Department (MGFD), and non-government environmental groups.

- Supervised and managed restoration and habitat enhancement projects. The geographic areas of responsibility included California, Arizona, Nevada, Utah, Virginia, Washington DC, and Maryland.

- Supervised and trained federal, state, and other agencies natural resource staff of biologists, ecologists, and fisheries in fieldwork sampling and data collection.

- Preparation of environmental documents in the areas of biology, hydrology, and geology (EIR/EIS, scientific publications, popular magazines, technical reports, seminars, and presentations) to include project proposals and budgets.

- Research biologist/museum specialist and principal investigator at the Smithsonian Institution (National Museum of Natural History) Department of Vertebrate Zoology, Division of Mammalogy and Herpetology.

- Participated in numerous consultations and preparation of Biological Opinion pursuant to the Endangered Species Act and Section 7 Consultation.

- Adjunct Professor of Biology at the Rancho Santiago Community College District lecturing in molecular biology, cellular biology, human anatomy/physiology, and general biology.

Professional History

01/2009 – present	Touré Associates, Fresno, CA. Project Director
12/2007 – 01/2009:	Michael Brandman Associates, Fresno, CA. Project Manager/Regulatory Specialist.
07/2004 – 12/2007:	Glenn Lukos Associates, Inc. Lake Forest, CA. Biologist/Regulatory Specialist
01/2006 – Present:	Rancho Santiago Community College. Orange, CA. Adjunct Professor of Biology
08/2000 – 07/2004:	U.S. Geological Survey, Western Ecological Research Center, San Diego Field Station, Carlsbad Office, Research Ecologist
06/1993 – 08/2000:	Smithsonian Institution, National Museum of Natural History, Washington, D.C., Museum Specialist/Principal Investigator

Education

Master of Science (MS): Biology (Emphasis in Ecology). Howard University, Washington, D.C.

Bachelor of Science (BS): Zoology/Chemistry. Howard University, Washington D.C.

N/A. Zoology/Chemistry Long Beach State University (transfer to Howard Univ.)

Additional Training

- Stormwater Pollution Prevention for Construction Sites. Fresno Metropolitan Flood Control District, 2009.
- Applied Hydrogeological Site Characterization & Monitoring Well Construction. Northwest Environmental Training Center, 2009.
- Arid West Supplement Wetland Delineation. Wetland Training Institute, 2007.
- Wetland Delineation with Emphasis in Hydric Soils. Wetland Training Institute, 2005.
- Boat Navigation and Safety Training. U.S. Geological Survey, 2002.
- Helicopter and Aviation Safety Training. U.S. Geological Survey, 2001.
- Geographical Information Systems (GIS) and PC Arc/Info. Smithsonian Institution, 1994.

Professional Publications

Touré, T. *et al* 2005. Common Reptiles, pp. 82-87, *In* Schoenherr, A., D. Clarke, and E. Brown. 2005. Docent Guide to Orange County Wilderness, 142 pp.

Touré, T.A., 2004, Checklist of amphibians and reptiles of Arroyo Seco and Los Angeles River Basin: U.S. Geological Survey Fact Sheet prepared for Los Angeles River–Arroyo Seco Confluence Park Project.

Touré, T.A., Backlin, A.R., and Fisher, R.N., 2004, Eradication and control of the African clawed frog (Xenopus laevis) on Irvine Ranch Land Reserve, Orange County, California, 2003: U.S. Geological Survey Final Report prepared for Irvine Ranch Land Reserve, Irvine, Calif., 31 p.

Touré, T.A., and Fisher, R.N., 2003, Quarterly Report – African clawed frog, pond turtle and spadefoot toad project: U.S. Geological Survey Technical Report prepared for The Nature Conservancy.

Touré, T. A. and G. A. Middendorf. 2002. Colonization of herpetofauna to a created wetland. Bulletin of the Maryland Herpetological Society 38(4): 99-117.

Touré, T. A. 2001. A report on the population status and conservation of Rosy boa (*Charina trivirgata*): A two-year study in Anza Borrego State Park and Joshua Tree National Monument, 19 pp.

Touré, T.A., and Fisher, R.N., 2001, Monitoring program for amphibians and reptiles in the Nature Reserve of Orange County, Summary Report 2001: U.S. Geological Survey Technical Report prepared for Nature Reserve of Orange County, Calif.

Touré, T. A. 1999. Herpetofauna of a constructed wetland and adjacent forest. Howard University, Washington DC. 20 tbs., 7 figs., 63 pp. [Also catalogued at the Smithsonian, U.S Natural History Museum, Washington, D.C.]

McDiarmid, R. W., J. C. Campbell, and T. A. Touré. 1999. Snake Species of the World Catalogue. A Geographical and Taxonomic Reference. Volume 1. The Herpetologist' League. Washington, DC. 511 pp.

McDiarmid, R. W., J. S. Savage, and T. A. Touré. 1997. The proper name of the tropical tree boa (*Hortulanus corallus*). J. Herpetology 30(3): 320-326.

Touré, T. A. 1995. Snakes: Suborder Serpentes, pp. 204-261, *In* Frank, N. and E. Ramus. 1995. A complete guide to scientific and common names of reptiles and amphibians of the world, 377 pp.

Professional Presentations

2007. Wetland and aquatic habitats of Orange County. [Education Series: Donna O'Neill Land Conservancy]
2006. Aquatic and riparian restoration ecology. [Seminar: Orange County Natural History Museum/Acorn Naturalist Center]
2004. Floral and faunal species conservation and management [Seminar: Santa Ana Park Naturalist Program, Department of Parks and Recreation]
2004. Spadefoot toad habitat enhancement training [Education Series: Laguna Coast Wilderness Park]
2003. Amphibian management: Concerns and opportunities. [Seminar: Nature Reserve of Orange County]
2003. Vernal pool ecology and spadefoot toads (*Spae hammondii*) of Orange County. [Seminar: Orange County Natural History Museum/Acorn Naturalist Center]
2003. Long-term monitoring of fragmented habitats in coastal southern California. [George Wright Society and ASIH, annual meeting]
2003. Exotic amphibians, current status and possible impacts. [Western Division of the American Fisheries Society, annual meeting]
2002. What's a herp? [Education Lecture Series: The Nature Conservancy of Orange County]
2001. Vertebrate abundance and diversity in fragmented habitats of coastal southern California. [Society for Conservation Biology, annual meeting]
2000. Constructed wetland and its ability to sustain amphibian and reptile populations. [Society of Wetland Scientists, annual meeting]
2000. Herpetofauna of a constructed wetland and adjacent forest. [ASIH, annual meeting]
2000. Reptiles and amphibians of the Sands Road Wetland Sanctuary. [ASIH, annual meeting]
1996. Snake species of the world: A taxonomic view. [ASIH, annual meeting]

Professional Affiliations

Association of Environmental Professionals
American Society of Ichthyologists and Herpetologists
Herpetologist League
Partners in Amphibian and Reptile Conservation
Declining Amphibian Task Force
Society of Conservation Biology
Society of Wetland Scientist
Southern California Wetland Recovery Project

Awards

2000. U.S. Geological Survey, Scientific Achievement Award, Patuxent Wildlife Research Center, Maryland
1999. Smithsonian Institution Libraries, Distinguished Subject Award
1998. Graduate Symposium Award, Howard University
1990. Smithsonian Tropical Research Institution, Research Internship Award, Republic of Panama

Professional Job References

Robert Francisco, Michael Brandman Associates, Vice-President (619) 764-9934
Tony Bomkamp, Glenn Lukos Associates, Senior Regulatory Specialist (949) 837-0404
Trish Smith, The Nature Conservancy, Senior Project Ecologist (714) 955-2810
Dr. Robert Fisher, USGS San Diego Field Station, Research Zoologist (619) 225-6436
Dr. Roy McDiarmid, Smithsonian Institution Museum of Natural History (202) 357-2778

ATTACHMENT 308-A

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

REBUTTAL TESTIMONY OF T'SHAKA TOURE ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 15, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

2398-072a

I. Introduction

I have been working for the California Unions for Reliable Energy ("CURE") as a consultant on the Application for Certification ("AFC") for the Blythe Solar Power Project ("Project" or "BSPP") since the data adequacy phase. I have reviewed the Applicant's submittals regarding impacts to waters of the State, the Staff Assessment/Draft Environmental Impact Statement ("SA/DEIS"), the Revised Staff Assessment, and the Applicant's Opening Testimony regarding biological resources, submitted on June 11, 2010. I have also conducted my own literature research and analyses regarding the Project's potential environmental impacts and alternatives.

My testimony addresses the Applicant's Opening Testimony regarding impacts to waters of the State, and is based on the activities described above and the knowledge and experience I have acquired during the more than 19 years of working in the field of natural resources management planning. A summary of my education and experience was included with my Opening Testimony.

II. Swales are State Jurisdictional Features

In opening testimony the Applicant states "swales occurring in desert regions do not and cannot conduct season surface flow."[1] This statement is untrue and contradicts statements made by the Applicant in the Jurisdictional Delineation Report prepared for the Blythe Solar Power Project ("Project") proceeding.[2] Specifically, the Applicant's Jurisdictional Delineation Report provides,

> The vegetated swales within the survey area appear to convey surface or subsurface water from a roughly northwest-to-southeast direction across the site. It is unlikely that these swales convey runoff every year, but there is evidence, through vegetative and hydrological indicators, that they move surface water across the landscape.[3]

The Applicant's Jurisdictional Delineation Report further provides that,

> In areas where evidence of distinct shelving and/or scour were absent, but some indication of past surface waterflow could be observed, it was ascertained that these features were either swales (that support low volume and duration surface flow

[1] Opening Testimony of Bill Graham et al, June 11, 2010, p. 5.
[2] Galati and Blek. 2009a. Blythe Solar Power Project Jurisdictional Delineation Report.
[3] Galati and Blek. 2009a. Blythe Solar Power Project Jurisdictional Delineation Report (Revised October 2009 and November 2009) at p. 28.

and/or were low lying undefined relatively linear features in the landscape that are unvegetated or primarily populated exclusively by Sonoran creosote bush scrub) or eroded relictual washes (that support sheetflow) during rain events.[4]

Additionally, based upon my field experience in desert regions, swales serve as an important ecological resource to aquatic and terrestrial species. Furthermore, regardless of how the section is titled for the "Creosote Bush Big Galleta Grass Community," functional swales (just as wetlands) do in fact occur in upland habitats. The creosote bush-big galleta community occurs in the wash understory and continues along the vegetated swales throughout the Project survey area.[5]

The U.S. Army Corps of Engineers can only take jurisdiction over three-parameter wetlands; however, CDFG has the authority to take jurisdiction over one- or two-parameter wetlands. As such, based on CDFG criteria for establishing wetlands, swales have been determined by CDFG staff as jurisdictional features. Based on my review of the existing information, CDFG appears to have considered the swales as two-parameter wetlands (providing vegetative and hydrological indicators) and therefore jurisdictional features of the State. The swales are capable of providing similar functions as a wetland and/or marsh habitat and therefore provide beneficial uses to both aquatic and terrestrial wildlife species.[6],[7] To disregard the functional values of swales and the biochemical and biological resources they provide would substantially understate the Project's significant impacts to biological resources and waters of the State.

As stated in my opening testimony, swales serve to trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff.[8] Therefore, in my professional opinion it is prudent and sound judgment by the CDFG and California Energy Commission Staff to require the Applicant to mitigate for impacts to vegetated swales.

---

[4] Ibid., p 26

[5] Ibid., p. 7

[6] Conserving Natural Areas and Wildlife in Your Community. Chapter 10: Stormwater Management for People and Wildlife.
http://www.dec.ny.gov/docs/remediation_hudson_pdf/hrebch10.pdf

[7] Stormwater Management: Swales. Sustainable Cities Institute.
http://www.sustainablecitiesinstitute.org/view/page.basic/class/feature.class/Lesson_Swales_Overview

[8] Testimony Of T'shaka Toure on Behalf Of California Unions For Reliable Energy for the Blythe Solar Power Project, June 11, 2010, pp. 7-8; *see also* U.S. Environmental Protection Agency. Storm Water Technology Fact Sheet. Vegetated Swales. 832-F-99-006. September 1999.

Declaration of T'Shaka Toure
Blythe Solar Power Project
Docket 09-AFC-6

I, T'Shaka Toure, declare as follows:

1) I am an independent biological resources consultant. I have been operating my own consulting business for the past 1.5 years. Prior to starting my own business I was employed as a biological and regulatory consultant.

2) I hold a Master of Science degree in Biology with an emphasis in Ecology. My relevant professional qualifications and experience are set forth in the attached testimony and are incorporated herein by reference.

3) I prepared testimony attached hereto and incorporated herein by reference, relating to impacts to waters of the State due to the Blythe Solar Power Project.

5) It is my professional opinion that the attached testimony is true and accurate with respect to the issues that it addresses.

6) I am personally familiar with the facts and conclusions described within the attached testimony, and if called as a witness, I could testify competently thereto.

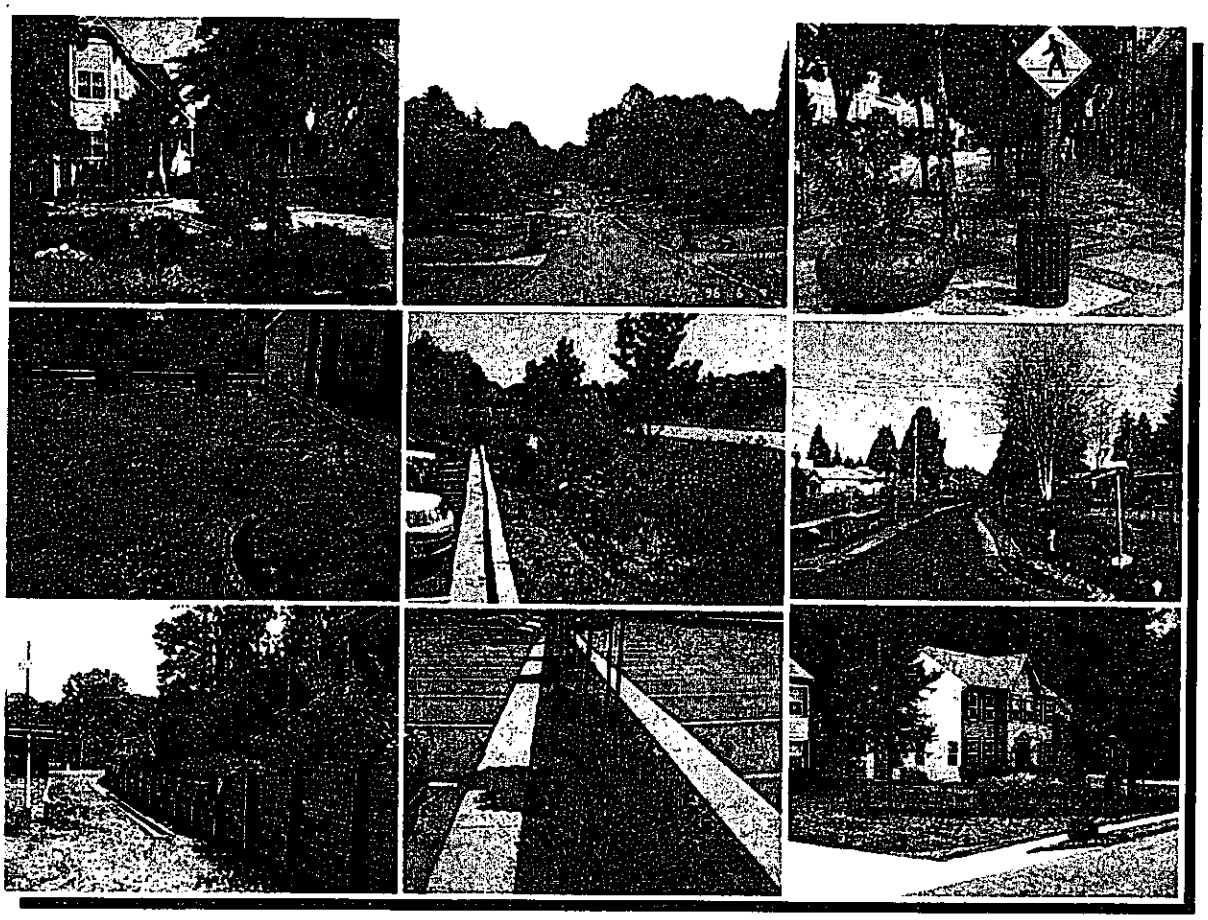
I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Dated: June 15, 2010 Signed: T'Shaka Toure

At: 11:30 am

EXHIBIT 309

Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices



Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices

December 2007

EPA 841-F-07-006

Prepared under Contract No. 68-C-02-108

United States Environmental Protection Agency

Nonpoint Source Control Branch (4503T)

1200 Pennsylvania Ave., NW

Washington, DC 20460

Available for download at www.epa.gov/nps/lid

CONTENTS

Contents i
Tables ii
Foreword iii
Executive Summary iv
Introduction 1
Background 1
Low Impact Development 2
Evaluations of Benefits and Costs 6
Overview of Benefits 6
Environmental Benefits 7
Land Value and Quality of Life Benefits 8
Compliance Incentives 9
Cost Considerations 9
Case Studies 11
2nd Avenue SEA Street, Seattle, Washington 12
Auburn Hills Subdivision, Southwestern Wisconsin 13
Bellingham, Washington, Parking Lot Retrofits 14
Central Park Commercial Redesigns, Fredericksburg, VA (A Modeling Study) 15
Crown Street, Vancouver, British Columbia 15
Gap Creek Subdivision, Sherwood, Arkansas 17
Garden Valley, Pierce County, Washington (A Modeling Study) 17
Kensington Estates, Pierce County, Washington (A Modeling Study) 18
Laurel Springs Subdivision, Jackson, Wisconsin 19
Mill Creek Subdivision, Kane County, Illinois 20
Poplar Street Apartments, Aberdeen, North Carolina 21
Portland Downspout Disconnection Program, Portland, Oregon 21
Prairie Crossing Subdivision, Grayslake, Illinois 22
Prairie Glen Subdivision, Germantown, Wisconsin 23
Somerset Subdivision, Prince George's County, Maryland 24
Tellabs Corporate Campus, Naperville, Illinois 25
Toronto Green Roofs, Toronto, Ontario (A Modeling Study) 26
Conclusion 27

TABLES

Table 1. Summary of LID Practices Employed in the Case Studies 11
Table 2. Summary of Cost Comparisons Between Conventional and LID Approaches 12
Table 3. Cost Comparison for 2nd Avenue SEA Street 13
Table 4. Cost Comparison for Auburn Hills Subdivision 14
Table 5. Cost Comparison for Bellingham's Parking Lot Rain Garden Retrofits 14
Table 6. Site Information and Cost Additions/Reductions Using LID Versus Traditional Designs 15
Table 7. Cost Comparison for Gap Creek Subdivision 17
Table 8. Cost Comparison for Garden Valley Subdivision 18
Table 9. Cost Comparison for Kensington Estates Subdivision 18
Table 10. Cost Comparison for Laurel Springs Subdivision 19
Table 11. Cost Comparison for Mill Creek Subdivision 20
Table 12. Cost Comparison for Prairie Crossing Subdivision 22
Table 13. Cost Comparison for Prairie Glen Subdivision 23
Table 14. Cost Comparison for Somerset Subdivision 24
Table 15. Cost Comparison for Tellabs Corporate Campus 25

FOREWORD

One of the most exciting new trends in water quality management today is the movement by many cities, counties, states, and private-sector developers toward the increased use of Low Impact Development (LID) to help protect and restore water quality. LID comprises a set of approaches and practices that are designed to reduce runoff of water and pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water.

Although the increase in application of these practices is growing rapidly, data regarding both the effectiveness of these practices and their costs remain limited. This document is focused on the latter issue, and the news is good. In the vast majority of cases, the U.S. Environmental Protection Agency (EPA) has found that implementing well-chosen LID practices saves money for developers, property owners, and communities while protecting and restoring water quality.

While this study focuses on the cost reductions and cost savings that are achievable through the use of LID practices, it is also the case that communities can experience many amenities and associated economic benefits that go beyond cost savings. These include enhanced property values, improved habitat, aesthetic amenities, and improved quality of life. This study does not monetize and consider these values in performing the cost calculations, but these economic benefits are real and significant. For that reason, EPA has included a discussion of these economic benefits in this document and provided references for interested readers to learn more about them.

Readers interested in increasing their knowledge about LID and Green Infrastructure, which encompasses LID along with other aspects of green development, should see www.epa.gov/npdes/greeninfrastructure and www.epa.gov/nps/lid. It is EPA's hope that as professionals and citizens continue to become more knowledgeable about the effectiveness and costs of LID, the use of LID practices will continue to increase at a rapid pace.

EXECUTIVE SUMMARY

This report summarizes 17 case studies of developments that include Low Impact Development (LID) practices and concludes that applying LID techniques can reduce project costs and improve environmental performance. In most cases, LID practices were shown to be both fiscally and environmentally beneficial to communities. In a few cases, LID project costs were higher than those for conventional stormwater management practices. However, in the vast majority of cases, significant savings were realized due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all cases, there were benefits that this study did not monetize and did not factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased total number of units developed, increased marketing potential, and faster sales. Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided. Examples of environmental benefits include reduced runoff volumes and pollutant loadings to downstream waters, and reduced incidences of combined sewer overflows. Finally, more research is needed to monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs, and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

INTRODUCTION

BACKGROUND

Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.

Extensive development in the United States is a relatively recent phenomenon. For the past two decades, the rate of land development across the country has been twice the rate of population growth. Approximately 25 million acres were developed between 1982 and 1997, resulting in a 34 percent increase in the amount of developed land with only a 15 percent increase in population.[1,2] The 25 million acres developed during this 15-year period represent nearly 25 percent of the total amount of developed land in the contiguous states. The U.S. population is expected to increase by 22 percent from 2000 to 2025. If recent development trends continue, an additional 68 million acres of land will be developed during this 25-year period.[3]

Water quality protection strategies are often implemented at three scales: the region or large watershed area, the community or neighborhood, and the site or block. Different stormwater approaches are used at different scales to afford the greatest degree of protection to waterbodies because the influences of pollution are often found at all three scales. For example, decisions about where and how to grow are the first and perhaps most important decisions related to water quality. Growth and development can give a community the resources needed to revitalize a downtown, refurbish a main street, build new schools, and develop vibrant places to live, work, shop, and play. The environmental impacts of development, however, can pose challenges for communities striving to protect their natural resources. Development that uses land efficiently and protects undisturbed natural lands allows a community to grow and still protect its water resources.

Strategies related to these broad growth and development issues are often implemented at the regional or watershed scale. Once municipalities have determined where to grow and where to preserve, various stormwater management techniques are applied at the neighborhood or community level. These measures, such as road width requirements, often transcend specific development sites and can be applied throughout a neighborhood. Finally, site-specific stormwater strategies, such as rain gardens and infiltration areas, are incorporated within a particular development. Of course, some stormwater management strategies can be applied at several scales. For example, opportunities to maximize infiltration can occur at the neighborhood and site levels.

Many smart growth approaches can decrease the overall amount of impervious cover associated with a development's footprint. These approaches include directing development to already degraded land; using narrower roads; designing smaller parking lots; integrating retail, commercial, and residential uses; and designing more compact residential lots. These development approaches, combined with other techniques aimed at reducing the impact of development, can offer communities superior stormwater management.

Stormwater management programs have struggled to provide adequate abatement and treatment of stormwater at the current levels of development. Future development will create even greater challenges for maintaining and improving water quality in the nation's waterbodies. The past few decades of stormwater management have resulted in the current convention of control-and-treatment strategies. They are largely engineered, end-of-pipe practices that have been focused on controlling peak flow rate and suspended solids concentrations. Conventional practices, however, fail to address the widespread and cumulative hydrologic modifications within the watershed that increase stormwater volumes and runoff rates and cause excessive erosion and stream channel degradation. Existing practices also fail to adequately treat for other pollutants of concern, such as nutrients, pathogens, and metals.

LOW IMPACT DEVELOPMENT

Low Impact Development (LID)[4] is a stormwater management strategy that has been adopted in many localities across the country in the past several years. It is a stormwater management approach and set of practices that can be used to reduce runoff and pollutant loadings by managing the runoff as close to its source(s) as possible. A set or system of small-scale practices, linked together on the site, is often used. LID approaches can be used to reduce the impacts of development and redevelopment activities on water resources. In the case of new development, LID is typically used to achieve or pursue the goal of maintaining or closely replicating the predevelopment hydrology of the site. In areas where development has already occurred, LID can be used as a retrofit practice to reduce runoff volumes, pollutant loadings, and the overall impacts of existing development on the affected receiving waters.

In general, implementing integrated LID practices can result in enhanced environmental performance while at the same time reducing development costs when compared to traditional stormwater management approaches. LID techniques promote the use of natural systems, which can effectively remove nutrients, pathogens, and metals from stormwater. Cost savings are typically seen in reduced infrastructure because the total volume of runoff to be managed is minimized through infiltration and evapotranspiration. By working to mimic the natural water cycle, LID practices protect downstream resources from adverse pollutant and hydrologic impacts that can degrade stream channels and harm aquatic life.

It is important to note that typical, real-world LID designs usually incorporate more than one type of practice or technique to provide integrated treatment of runoff from a site. For example, in lieu of a treatment pond serving a new subdivision, planners might incorporate a bioretention area in each yard, disconnect downspouts from driveway surfaces, remove curbs, and install grassed swales in common areas. Integrating small

practices throughout a site instead of using extended detention wet ponds to control runoff from a subdivision is the basis of the LID approach.

When conducting cost analyses of these practices, examples of projects where actual practice-by-practice costs were considered separately were found to be rare because material and labor costs are typically calculated for an entire site rather than for each element within a larger system. Similarly, it is difficult to calculate the economic benefits of individual LID practices on the basis of their effectiveness in reducing runoff volume and rates or in treating pollutants targeted for best management practice (BMP) performance monitoring.

The following is a summary of the different categories of LID practices, including a brief description and examples of each type of practice.

Conservation designs can be used to minimize the generation of runoff by preserving open space. Such designs can reduce the amount of impervious surface, which can cause increased runoff volumes. Open space can also be used to treat the increased runoff from the built environment through infiltration or evapotranspiration. For example, developers can use conservation designs to preserve important features on the site such as wetland and riparian areas, forested tracts, and areas of porous soils. Development plans that outline the smallest site disturbance area can minimize the stripping of topsoil and compaction of subsoil that result from grading and equipment use. By preserving natural areas and not clearing and grading the entire site for housing lots, less total runoff is generated on the development parcel. Such simplistic, nonstructural methods can reduce the need to build large structural runoff controls like retention ponds and stormwater conveyance systems and thereby decrease the overall infrastructure costs of the project. Reducing the total area of impervious surface by limiting road widths, parking area, and sidewalks can also reduce the volume of runoff that must be treated. Residential developments that incorporate conservation design principles also can benefit residents and their quality of life due to increased access and proximity to communal open space, a greater sense of community, and expanded recreational opportunities.

Examples of Conservation Design

- Cluster development
- Open space preservation
- Reduced pavement widths (streets, sidewalks)
- Shared driveways
- Reduced setbacks (shorter driveways)
- Site fingerprinting during construction

Infiltration practices are engineered structures or landscape features designed to capture and infiltrate runoff. They can be used to reduce both the volume of runoff discharged from the site and the infrastructure needed to convey, treat, or control runoff. Infiltration practices can also be used to recharge ground water. This benefit is especially important in areas where maintaining drinking water supplies and stream baseflow is of special concern because of limited precipitation or a high ratio of withdrawal to recharge rates. Infiltration of runoff can also help to maintain stream temperatures because the infiltrated water that moves laterally to replenish stream baseflow typically has a lower temperature than overland flows, which might be subject

Examples of Infiltration Practices

- Infiltration basins and trenches
- Porous pavement
- Disconnected downspouts
- Rain gardens and other vegetated treatment systems

to solar radiation. Another advantage of infiltration practices is that they can be integrated into landscape features in a site-dispersed manner. This feature can result in aesthetic benefits and, in some cases, recreational opportunities; for example, some infiltration areas can be used as playing fields during dry periods.

Runoff storage practices. Impervious surfaces are a central part of the built environment, but runoff from such surfaces can be captured and stored for reuse or gradually infiltrated, evaporated, or used to irrigate plants. Using runoff storage practices has several benefits. They can reduce the volume of runoff discharged to surface waters, lower the peak flow hydrograph to protect streams from the erosive forces of high flows, irrigate landscaping, and provide aesthetic benefits such as landscape islands, tree boxes, and rain gardens. Designers can take advantage of the void space beneath paved areas like parking lots and sidewalks to provide additional storage. For example, underground vaults can be used to store runoff in both urban and rural areas.

Examples of Runoff Storage Practices

- Parking lot, street, and sidewalk storage
- Rain barrels and cisterns
- Depressional storage in landscape islands and in tree, shrub, or turf depressions
- Green roofs

Runoff conveyance practices. Large storm events can make it difficult to retain all the runoff generated on-site by using infiltration and storage practices. In these situations, conveyance systems are typically used to route excess runoff through and off the site. In LID designs, conveyance systems can be used to slow flow velocities, lengthen the runoff time of concentration, and delay peak flows that are discharged off-site. LID conveyance practices can be used as an alternative to curb-and-gutter systems, and from a water quality perspective they have advantages over conventional approaches designed to rapidly convey runoff off-site and alleviate on-site flooding. LID conveyance practices often have rough surfaces, which slow runoff and increase evaporation and settling of solids. They are typically permeable and vegetated, which promotes infiltration, filtration, and some biological uptake of pollutants. LID conveyance practices also can perform functions similar to those of conventional curbs, channels, and gutters. For example, they can be used to reduce flooding around structures by routing runoff to landscaped areas for treatment, infiltration, and evapotranspiration.

Examples of Runoff Conveyance Practices

- Eliminating curbs and gutters
- Creating grassed swales and grass-lined channels
- Roughening surfaces
- Creating long flow paths over landscaped areas
- Installing smaller culverts, pipes, and inlets
- Creating terraces and check dams

Filtration practices are used to treat runoff by filtering it through media that are designed to capture pollutants through the processes of physical filtration of solids and/or cation exchange of dissolved pollutants. Filtration practices offer many of the same benefits as infiltration, such as reductions in the volume of runoff transported off-site, ground water recharge, increased stream baseflow, and reductions in thermal impacts to receiving waters. Filtration practices also have the added advantage of providing increased pollutant removal benefits. Although pollutant build-up and removal may be of concern, pollutants are typically captured in the upper soil horizon and can be removed by replacing the topsoil.

Examples of Filtration Practices

- Bioretention/rain gardens
- Vegetated swales
- Vegetated filter strips/buffers

Low impact landscaping. Selection and distribution of plants must be carefully planned when designing a functional landscape. Aesthetics are a primary concern, but it is also important to consider long-term maintenance goals to reduce inputs of labor, water, and chemicals. Properly preparing soils and selecting species adapted to the microclimates of a site greatly increases the success of plant establishment and growth, thereby stabilizing soils and allowing for biological uptake of pollutants. Dense, healthy plant growth offers such benefits as pest resistance (reducing the need for pesticides) and improved soil infiltration from root growth. Low impact landscaping can thus reduce impervious surfaces, improve infiltration potential, and improve the aesthetic quality of the site.

Examples of Low Impact Landscaping

- Planting native, drought-tolerant plants
- Converting turf areas to shrubs and trees
- Reforestation
- Encouraging longer grass length
- Planting wildflower meadows rather than turf along medians and in open space
- Amending soil to improve infiltration

EVALUATIONS OF BENEFITS AND COSTS

To date, the focus of traditional stormwater management programs has been concentrated largely on structural engineering solutions to manage the hydraulic consequences of the increased runoff that results from development. Because of this emphasis, stormwater management has been considered primarily an engineering endeavor. Economic analyses regarding the selection of solutions that are not entirely based on pipes and ponds have not been a significant factor in management decisions. Where costs have been considered, the focus has been primarily on determining capital costs for conventional infrastructure, as well as operation and maintenance costs in dollars per square foot or dollars per pound of pollutant removed.

Little attention has been given to the benefits that can be achieved through implementing LID practices. For example, communities rarely attempt to quantify and monetize the pollution prevention benefits and avoided treatment costs that might accrue from the use of conservation designs or LID techniques. To be more specific, the benefits of using LID practices to decrease the need for combined sewer overflow (CSO) storage and conveyance systems should be factored into the economic analyses. One of the major factors preventing LID practices from receiving equal consideration in the design or selection process is the difficulty of monetizing the environmental benefits of these practices. Without good data and relative certainty that these alternatives will work and not increase risk or cost, current standards of practice are difficult to change.

This report is an effort to compare the projected or known costs of LID practices with those of conventional development approaches. At this point, monetizing the economic and environmental benefits of LID strategies is much more difficult than monetizing traditional infrastructure costs or changes in property values due to improvements in existing utilities or transportation systems. Systems of practices must be analyzed to determine net performance and monetary benefits based on the capacity of the systems to both treat for pollutants and reduce impacts through pollution prevention. For example, benefits might come in the form of reduced stream channel degradation, avoided stream restoration costs, or reduced drinking water treatment costs.

One of the chief impediments to getting useful economic data to promote more widespread use of LID techniques is the lack of a uniform baseline with which to compare the costs and benefits of LID practices against the costs of conventional stormwater treatment and control. Analyzing benefits is further complicated in cases where the environmental performance of the conservation design or LID system exceeds that of the conventional runoff management system, because such benefits are not easily monetized. The discussion below is intended to provide a general discussion of the range of economic benefits that may be provided by LID practices in a range of appropriate circumstances.

OVERVIEW OF BENEFITS

The following is a brief discussion of some of the actual and assumed benefits of LID practices. Note that environmental and ancillary benefits typically are not measured as part of development projects, nor are they measured as part of pilot or demonstration projects, because they can be difficult to isolate and quantify. Many of the benefits described below are assumed on the basis of limited studies and anecdotal evidence.

The following discussion is organized into three categories: (1) environmental benefits, which include reductions in pollutants, protection of downstream water resources, ground water recharge, reductions in pollutant treatment costs, reductions in the frequency and severity of CSOs, and habitat improvements; (2) land value benefits, which include reductions in downstream flooding and property damage, increases in real estate value, increased parcel lot yield, increased aesthetic value, and improvement of quality of life by providing open space for recreation; and (3) compliance incentives.

Environmental Benefits

Pollution abatement. LID practices can reduce both the volume of runoff and the pollutant loadings discharged into receiving waters. LID practices result in pollutant removal through settling, filtration, adsorption, and biological uptake. Reductions in pollutant loadings to receiving waters, in turn, can improve habitat for aquatic and terrestrial wildlife and enhance recreational uses. Reducing pollutant loadings can also decrease stormwater and drinking water treatment costs by decreasing the need for regional stormwater management systems and expansions in drinking water treatment systems.

Protection of downstream water resources. The use of LID practices can help to prevent or reduce hydrologic impacts on receiving waters, reduce stream channel degradation from erosion and sedimentation, improve water quality, increase water supply, and enhance the recreational and aesthetic value of our natural resources. LID practices can be used to protect water resources that are downstream in the watershed. Other potential benefits include reduced incidence of illness from contact recreation activities such as swimming and wading, more robust and safer seafood supplies, and reduced medical treatment costs.

Ground water recharge. LID practices also can be used to infiltrate runoff to recharge ground water. Growing water shortages nationwide increasingly indicate the need for water resource management strategies designed to integrate stormwater, drinking water, and wastewater programs to maximize benefits and minimize costs. Development pressures typically result in increases in the amount of impervious surface and volume of runoff. Infiltration practices can be used to replenish ground water and increase stream baseflow. Adequate baseflow to streams during dry weather is important because low ground water levels can lead to greater fluctuations in stream depth, flows, and temperatures, all of which can be detrimental to aquatic life.

Water quality improvements/reduced treatment costs. It is almost always less expensive to keep water clean than it is to clean it up. The Trust for Public Land[5] noted Atlanta's tree cover has saved more than $883 million by preventing the need for stormwater retention facilities. A study of 27 water suppliers conducted by the Trust for Public Land and the American Water Works Association[6] found a direct relationship between forest cover in a watershed and water supply treatment costs. In other words, communities with higher percentages of forest cover had lower treatment costs. According to the study, approximately 50 to 55 percent of the variation in treatment costs can be explained by the percentage of forest cover in the source area. The researchers also found that for every 10 percent increase in forest cover in the source area, treatment and chemical costs decreased approximately 20 percent, up to about 60 percent forest cover.

Reduced incidence of CSOs. Many municipalities have problems with CSOs, especially in areas with aging infrastructure. Combined sewer systems discharge sanitary wastewater during storm events. LID techniques, by retaining and infiltrating runoff, reduce the frequency and amount of CSO discharges to receiving waters. Past management efforts typically have been concentrated on hard engineering approaches focused on treating the total volume of sanitary waste together with the runoff that is discharged to the combined system. Recently, communities like Portland (Oregon), Chicago, and Detroit have been experimenting with watershed approaches aimed at reducing the total volume of runoff generated that must be handled by the combined system. LID techniques have been the primary method with which they have experimented to reduce runoff. A Hudson Riverkeeper report concluded, based on a detailed technical analysis, that New York City could reduce its CSO's more cost-effectively with LID practices than with conventional, hard infrastructure CSO storage practices.[7]

Habitat improvements. Innovative stormwater management techniques like LID or conservation design can be used to improve natural resources and wildlife habitat, maintain or increase land value, or avoid expensive mitigation costs.

Land Value and Quality of Life Benefits

Reduced downstream flooding and property damage. LID practices can be used to reduce downstream flooding through the reduction of peak flows and the total amount or volume of runoff. Flood prevention reduces property damage and can reduce the initial capital costs and the operation and maintenance costs of stormwater infrastructure. Strategies designed to manage runoff on-site or as close as possible to its point of generation can reduce erosion and sediment transport as well as reduce flooding and downstream erosion. As a result, the costs for cleanups and streambank restoration can be reduced or avoided altogether. The use of LID techniques also can help protect or restore floodplains, which can be used as park space or wildlife habitat.[8]

Real estate value/property tax revenue. Homeowners and property owners are willing to pay a premium to be located next to or near aesthetically pleasing amenities like water features, open space, and trails. Some stormwater treatment systems can be beneficial to developers because they can serve as a "water" feature or other visual or recreational amenity that can be used to market the property. These designs should be visually attractive and safe for the residents and should be considered an integral part of planning the development. Various LID projects and smart growth studies have shown that people are willing to pay more for clustered homes than conventionally designed subdivisions. Clustered housing with open space appreciated at a higher rate than conventionally designed subdivisions. EPA's *Economic Benefits of Runoff Controls*[9] describes numerous examples where developers and subsequent homeowners have received premiums for proximity to attractive stormwater management practices.

Lot yield. LID practices typically do not require the large, contiguous areas of land that are usually necessary when traditional stormwater controls like ponds are used. In cases where LID practices are incorporated on individual house lots and along roadsides as part of the landscaping, land that would normally be dedicated for a stormwater pond or other large structural control can be developed with additional housing lots.

Aesthetic value. LID techniques are usually attractive features because landscaping is an integral part of the designs. Designs that enhance a property's aesthetics using trees, shrubs, and flowering plants that complement other landscaping features can be selected. The use of these designs may increase property values or result in faster sale of the property due to the perceived value of the "extra" landscaping.

Public spaces/quality of life/public participation. Placing water quality practices on individual lots provides opportunities to involve homeowners in stormwater management and enhances public awareness of water quality issues. An American Lives, Inc., real estate study found that 77.7 percent of potential homeowners rated natural open space as "essential" or "very important" in planned communities.[10]

Compliance Incentives

Regulatory compliance credits. Many states recognize the positive benefits LID techniques offer, such as reduced wetland impacts. As a result, they might offer regulatory compliance credits, streamlined or simpler permit processes, and other incentives similar to those offered for other green practices. For example, in Maryland the volume required for the permanent pool of a wet pond can be reduced if rooftop runoff is infiltrated on-site using LID practices. This procedure allows rooftop area to be subtracted from the total impervious area, thereby reducing the required size of the permanent pool. In addition, a LID project can have less of an environmental impact than a conventional project, thus requiring smaller impact fees.

COST CONSIDERATIONS

Traditional approaches to stormwater management involve conveying runoff off-site to receiving waters, to a combined sewer system, or to a regional facility that treats runoff from multiple sites. These designs typically include hard infrastructure, such as curbs, gutters, and piping. LID-based designs, in contrast, are designed to use natural drainage features or engineered swales and vegetated contours for runoff conveyance and treatment. In terms of costs, LID techniques like conservation design can reduce the amount of materials needed for paving roads and driveways and for installing curbs and gutters. Conservation designs can be used to reduce the total amount of impervious surface, which results in reduced road and driveway lengths and reduced costs. Other LID techniques, such as grassed swales, can be used to infiltrate roadway runoff and eliminate or reduce the need for curbs and gutters, thereby reducing infrastructure costs. Also, by infiltrating or evaporating runoff, LID techniques can reduce the size and cost of flood-control structures. Note that more research is needed to determine the optimal combination of LID techniques and detention practices for flood control.

It must be stated that the use of LID techniques might not always result in lower project costs. The costs might be higher because of the costs of plant material, site preparation, soil amendments, underdrains and connections to municipal stormwater systems, and increased project management.

Another factor to consider when comparing costs between traditional and LID designs is the amount of land required to implement a management practice. Land must be set aside for both traditional stormwater management practices and LID practices, but the former require the use of land *in addition to* individual lots and other community areas, whereas bioretention areas and swales can be incorporated into the landscaping of yards, in rights-

of-way along roadsides, and in or adjacent to parking lots. The land that would have been set aside for ponds or wetlands can in many cases be used for additional housing units, yielding greater profits.

Differences in maintenance requirements should also be considered when comparing costs. According to a 1999 EPA report, maintenance costs for retention basins and constructed wetlands were estimated at 3 to 6 percent of construction costs, whereas maintenance costs for swales and bioretention practices were estimated to be 5 to 7 percent of construction costs.[11] However, much of the maintenance for bioretention areas and swales can be accomplished as part of routine landscape maintenance and does not require specialized equipment. Wetland and pond maintenance, on the other hand, involves heavy equipment to remove accumulated sediment, oils, trash, and vegetation in forebays and open ponds.

Finally, in some circumstances LID practices can offset the costs associated with regulatory requirements for stormwater control. In urban redevelopment projects where land is not likely to be available for large stormwater management practices, developers can employ site-dispersed BMPs in sidewalk areas, in courtyards, on rooftops, in parking lots, and in other small outdoor spaces, thereby avoiding the fees that some municipalities charge when stormwater mitigation requirements cannot otherwise be met. In addition, stormwater utilities often provide credits for installing runoff management practices such as LID practices.[12]

CASE STUDIES

The case studies presented below are not an exhaustive list of LID projects nationwide. These examples were selected on the basis of the quantity and quality of economic data, quantifiable impacts, and types of LID practices used. Economic data are available for many other LID installations, but those installations often cannot be compared with conventional designs because of the unique nature of the design or the pilot status of the project. Table 1 presents a summary of the LID practices employed in each case study.

Table 1. Summary of LID Practices Employed in the Case Studies

Name	LID Techniques							
	Bioretention	Cluster Building	Reduced Impervious Area	Swales	Permeable Pavement	Vegetated Landscaping	Wetlands	Green Roofs
2nd Avenue SEA Street	✓		✓	✓				
Auburn Hills	✓		✓	✓		✓	✓	
Bellingham Parking Lot Retrofits	✓							
Central Park Commercial Redesigns	✓			✓				
Crown Street	✓		✓	✓				
Gap Creek			✓			✓		
Garden Valley	✓	✓		✓	✓		✓	
Kensington Estates		✓	✓		✓	✓	✓	
Laurel Springs	✓	✓	✓	✓				
Mill Creek		✓	✓	✓				
Poplar Street Apartments	✓			✓			✓	
Portland Downspout Disconnection*			✓					
Prairie Crossing	✓		✓	✓		✓		
Prairie Glen	✓	✓	✓	✓		✓	✓	
Somerset	✓			✓				
Tellabs Corporate Campus	✓			✓		✓	✓	
Toronto Green Roofs								✓

*Although impervious area stays the same, the disconnection program reduces directly connected impervious area.

The case studies contain an analysis of development costs, which are summarized in Table 2. Note that some case study results do not lend themselves well to a traditional vs.

LID cost comparison and therefore are not included in Table 2 (as noted). *Conventional development cost* refers to costs incurred or estimated for a traditional stormwater management approach, whereas *LID cost* refers to costs incurred or estimated for using LID practices. *Cost difference* is the difference between the conventional development cost and the LID cost. *Percent difference* is the cost savings relative to the conventional development cost.

Table 2. Summary of Cost Comparisons Between Conventional and LID Approaches[a]

Project	Conventional Development Cost	LID Cost	Cost Difference[b]	Percent Difference[b]
2nd Avenue SEA Street	$868,803	$651,548	$217,255	25%
Auburn Hills	$2,360,385	$1,598,989	$761,396	32%
Bellingham City Hall	$27,600	$5,600	$22,000	80%
Bellingham Bloedel Donovan Park	$52,800	$12,800	$40,000	76%
Gap Creek	$4,620,600	$3,942,100	$678,500	15%
Garden Valley	$324,400	$260,700	$63,700	20%
Kensington Estates	$765,700	$1,502,900	–$737,200	-96%
Laurel Springs	$1,654,021	$1,149,552	$504,469	30%
Mill Creek[c]	$12,510	$9,099	$3,411	27%
Prairie Glen	$1,004,848	$599,536	$405,312	40%
Somerset	$2,456,843	$1,671,461	$785,382	32%
Tellabs Corporate Campus	$3,162,160	$2,700,650	$461,510	15%

[a] The Central Park Commercial Redesigns, Crown Street, Poplar Street Apartments, Prairie Crossing, Portland Downspout Disconnection, and Toronto Green Roofs study results do not lend themselves to display in the format of this table.
[b] Negative values denote increased cost for the LID design over conventional development costs.
[c] Mill Creek costs are reported on a per-lot basis.

2ND AVENUE SEA STREET, SEATTLE, WASHINGTON

The 2nd Avenue Street Edge Alternative (SEA) Street project was a pilot project undertaken by Seattle Public Utilities to redesign an entire 660-foot block with a number of LID techniques. The goals were to reduce stormwater runoff and to provide a more "livable" community. Throughout the design and construction process, Seattle Public Utilities worked collaboratively with street residents to develop the final street design.[13]

The design reduced imperviousness, included retrofits of bioswales to treat and manage stormwater, and added 100 evergreen trees and 1,100 shrubs.[14] Conventional curbs and gutters were replaced with bioswales in the rights-of-way on both sides of the street, and the street width was reduced from 25 feet to 14 feet. The final constructed design reduced imperviousness by more than 18 percent. An estimate for the final total project cost was $651,548. A significant amount of community outreach was involved, which raised the level of community acceptance. Community input is important for any project, but because this was a pilot study, much more was spent on communication and redesign than what would be spent for a typical project.

The costs for the LID retrofit were compared with the estimated costs of a conventional street retrofit (Table 3). Managing stormwater with LID techniques resulted in a cost savings of 29 percent. Also, the reduction in street width and sidewalks reduced paving costs by 49 percent.

Table 3. Cost Comparison for 2nd Avenue SEA Street [15]

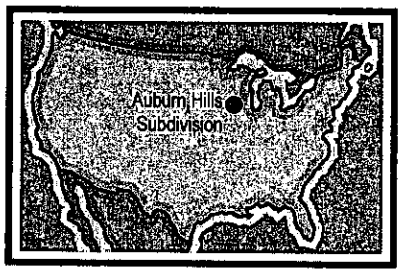
Item	Conventional Development Cost	SEA Street Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$65,084	$88,173	–$23,089	–35%	–11%
Stormwater management	$372,988	$264,212	$108,776	29%	50%
Site paving and sidewalks	$287,646	$147,368	$140,278	49%	65%
Landscaping	$78,729	$113,034	–$34,305	–44%	–16%
Misc. (mobilization, etc.)	$64,356	$38,761	$25,595	40%	12%
Total	**$868,803**	**$651,548**	**$217,255**	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The avoided cost for stormwater infrastructure and reduced cost for site paving accounted for much of the overall cost savings. The nature of the design, which included extensive use of bioswales and vegetation, contributed to the increased cost for site preparation and landscaping. Several other SEA Street projects have been completed or are under way, and cost evaluations are expected to be favorable.

For this site, the environmental performance has been even more significant than the cost savings. Hydrologic monitoring of the project indicates a 99 percent reduction in total potential surface runoff, and runoff has not been recorded at the site since December 2002, a period that included the highest-ever 24-hour recorded rainfall at Seattle-Tacoma Airport.[16] The site is retaining more than the original design estimate of 0.75 inch of rain. A modeling analysis indicates that if a conventional curb-and-gutter system had been installed along 2nd Avenue instead of the SEA Street design, 98 times more stormwater would have been discharged from the site.[17]

AUBURN HILLS SUBDIVISION, SOUTHWESTERN WISCONSIN



Auburn Hills in southwestern Wisconsin is a residential subdivision developed with conservation design principles. Forty percent of the site is preserved as open space; this open space includes wetlands, green space and natural plantings, and walking trails. The subdivision was designed to include open swales and bioretention for stormwater management. To determine potential savings from using conservation design, the site construction costs were compared with the estimated cost of building the site as a conventional subdivision.[18] Reduced stormwater management costs accounted for approximately 56 percent of the total cost savings. A cost comparison is provided in Table 4. Other savings not shown in Table 4 were realized as a result of reduced sanitary sewer, water distribution, and utility construction costs.

Table 4. Cost Comparison for Auburn Hills Subdivision [19]

Item	Conventional Development Cost	Auburn Hills LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$699,250	$533,250	$166,000	24%	22%
Stormwater management	$664,276	$241,497	$422,779	64%	56%
Site paving and sidewalks	$771,859	$584,242	$187,617	24%	25%
Landscaping	$225,000	$240,000	–$15,000	-7%	-2%
Total	**$2,360,385**	**$1,598,989**	**$761,396**	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The clustered design used in the development protected open space and reduced clearing and grading costs. Costs for paving and sidewalks were also decreased because the cluster design reduced street length and width. Stormwater savings were realized primarily through the use of vegetated swales and bioswales. These LID practices provided stormwater conveyance and treatment and also lowered the cost of conventional stormwater infrastructure. The increase in landscaping costs resulted from additional open space present on-site compared to a conventional design, as well as increased street sweeping. Overall, the subdivision's conservation design retained more natural open space for the benefit and use of the homeowners and aided stormwater management by preserving some of the site's natural hydrology.[20]

BELLINGHAM, WASHINGTON, PARKING LOT RETROFITS

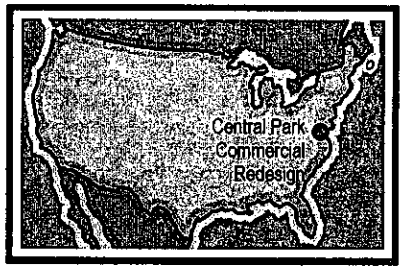
The City of Bellingham, Washington, retrofitted two parking lots—one at City Hall and the other at Bloedel Donovan Park—with rain gardens in lieu of installing underground vaults to manage stormwater.[21] At City Hall, 3 parking spaces out of a total of 60 were used for the rain garden installation. The Bloedel Donovan Park retrofit involved converting to a rain garden a 550-square-foot area near a catch basin. Both installations required excavation, geotextile fabric, drain rock, soil amendments, and native plants. Flows were directed to the rain gardens by curbs. An overflow system was installed to accommodate higher flows during heavy rains.

The City compared actual rain garden costs to estimates for conventional underground vaults based on construction costs for similar projects in the area ($12.00 per cubic foot of storage). Rain garden costs included labor, vehicle use/rental, and materials. Table 5 shows that the City Hall rain garden saved the City $22,000, or 80 percent, over the underground vault option; the Bloedel Donovan Park installation saved $40,000, or 76 percent.

Table 5. Cost Comparison for Bellingham's Parking Lot Rain Garden Retrofits[22]

Project	Conventional Vault Cost	Rain Garden Cost	Cost Savings	Percent Savings
City Hall	$27,600	$5,600	$22,000	80%
Bloedel Donovan Park	$52,800	$12,800	$40,000	76%

CENTRAL PARK COMMERCIAL REDESIGNS, FREDERICKSBURG, VA (A MODELING STUDY)



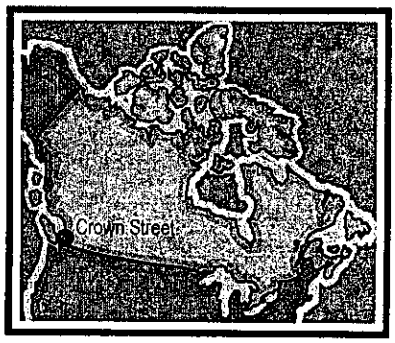
The Friends of the Rappahannock undertook a cost analysis involving the redesign of site plans for several stores in a large commercial development in the Fredericksburg, Virginia, area called Central Park.[23,24] Table 6 contains a side-by-side analysis of the cost additions and reductions for each site for scenarios where LID practices (bioretention areas and swales) were incorporated into the existing, traditional site designs. In five of the six examples, the costs for the LID redesigns were higher than those for the original designs, although they never exceeded $10,000, or 10 percent of the project. One example yielded a $5,694 savings. The fact that these projected costs for LID were comparable to the costs for traditional designs convinced the developer to begin incorporating LID practices into future design projects.[25]

Table 6. Site Information and Cost Additions/Reductions Using LID Versus Traditional Designs

Name	Total BMP Area (ft²)	Total Impervious Area Treated (ft²)	Percent of Impervious Area Treated	Cost Additions[a]	Cost Reductions[b]	Change in Cost After Redesign
Breezewood Station Alternative 1	4,800	64,165	98.4%	$36,696	$34,785	+ $1,911
Breezewood Station Alternative 2	3,500	38,775	59.5%	$24,449	$21,060	+ $3,389
Olive Garden	1,780	31,900	59.1%	$14,885	$11,065	+ $3,790
Kohl's, Best Buy, & Office Depot	14,400	354,238	56.3%	$89,433	$80,380	+ $9,053
First Virginia Bank	1,310	20,994	97.7%	$6,777	$1,148	+ $5,629
Chick-Fil-A[c]	1,326	28,908	82.2%	$6,846	$12,540	– $5,694

[a] Additional costs for curb, curb blocks, storm piping, inlets, underdrains, soil, mulch, and vegetation as a result of the redesign.
[b] Reduced cost for curb, storm piping, roof drain piping, and inlets as a result of the redesign.
[c] Cost reduction value includes the cost of a Stormceptor unit that is not needed as part of the redesign.

CROWN STREET, VANCOUVER, BRITISH COLUMBIA



In 1995 the Vancouver City Council adopted a Greenways program that is focused on introducing pedestrian-friendly green space into the City to connect trails, environmental areas, and urban space. As a part of this program, the City has adopted strategies to manage stormwater runoff from roadways. Two initiatives are discussed here.

The Crown Street redevelopment project, completed in 2005, retrofitted a 1,100-foot block of traditional curb-and-gutter street with a naturalized streetscape modeled after the Seattle SEA Street design. Several LID features were incorporated into the design. The total imperviousness of the street was decreased by reducing the street width from 28 feet to 21 feet with one-

way sections of the road narrowed to 10 feet. Roadside swales that use vegetation and structural grass (grass supported by a grid and soil structure that prevents soil compaction and root damage) were installed to collect and treat stormwater through infiltration.[26]

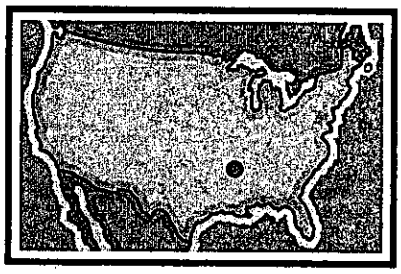
Modeling predicts that the redesigned street will retain 90 percent of the annual rainfall volume on-site; the remaining 10 percent of runoff will be treated by the system of vegetated swales before discharging.[27,28] The City chose to use the LID design because stormwater runoff from Crown Street flows into the last two salmon-bearing creeks in Vancouver.[29] Monitoring until 2010 will assess the quality of stormwater runoff and compare it with both the modeling projections and the runoff from a nearby curb-and-gutter street.

The cost of construction for the Crown Street redevelopment was $707,000. Of this, $311,000 was attributed to the cost of consultant fees and aesthetic design features, which were included in the project because it was the first of its kind in Vancouver. These added costs would not be a part of future projects. Discounting the extra costs, the $396,000 construction cost is 9 percent higher than the estimated $364,000 conventional curb-and-gutter design cost.[30] The City has concluded that retrofitting streets that have an existing conventional stormwater system with naturalized designs will cost marginally more than making curb-and-gutter improvements, but installing naturalized street designs in new developments will be less expensive than installing conventional drainage systems.[31,32]

One goal of Vancouver's Greenways program is to make transportation corridors more pedestrian-friendly. A method used to achieve this goal is to extend curbs at intersections out into the street to lessen the crossing distance and improve the line of sight for pedestrians. When this initiative began, the City relocated stormwater catch basins that would have been enclosed within the extended curb. Now, at certain intersections, the City uses the new space behind the curb to install "infiltration bulges" to collect and infiltrate roadway runoff. The infiltration bulges are constructed of permeable soils and vegetation. (The City of Portland, Oregon, has installed similar systems, which they call "vegetated curb extensions.") The catch basins are left in place, and any stormwater that does not infiltrate into the soil overflows into the storm drain system.[33]

The infiltration bulges have resulted in savings for the City. Because the stormwater infiltration bulges are installed in conjunction with planned roadway improvements, the only additional costs associated with the stormwater project are the costs of a steel curb insert to allow stormwater to enter the bulge and additional soil excavation costs. These additional costs are more than offset by the $2,400 to $4,000 cost that would have been required to relocate the catch basins. To date, the City has installed nine infiltration bulges, three of which are maintained by local volunteers as part of a Green Streets program in which local residents adopt city green space.[34]

GAP CREEK SUBDIVISION, SHERWOOD, ARKANSAS



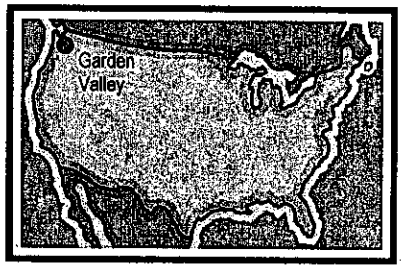
Gap Creek's original subdivision plan was revised to include LID concepts. The revised design increased open space from the originally planned 1.5 acres to 23.5 acres. Natural drainage areas were preserved and buffered by greenbelts. Traffic-calming circles were used, allowing the developer to reduce street widths from 36 to 27 feet. In addition, trees were kept close to the curb line. These design techniques allowed the development of 17 additional lots.

The lots sold for $3,000 more and cost $4,800 less to develop than comparable conventional lots. A cost comparison is provided in Table 7. For the entire development, the combination of cost savings and lot premiums resulted in an additional profit to the developer of $2.2 million.[35,36]

Table 7. Cost Comparison for Gap Creek Subdivision[37]

Total Cost of Conventional Design	Gap Creek LID Cost	Cost Savings	Percent Savings	Savings per Lot
$4,620,600	$3,942,100	$678,500	15%	$4,800

GARDEN VALLEY, PIERCE COUNTY, WASHINGTON (A MODELING STUDY)



The Garden Valley subdivision is a 9.7-acre site in Pierce County, Washington. A large wetland on the eastern portion of the site and a 100-foot buffer account for 43 percent of the site area. Designers evaluated a scenario in which roadway widths were reduced and conventional stormwater management practices were replaced with swales, bioretention, and soil amendments. The use of these LID elements would have allowed the cost for stormwater management on the site to be reduced by 72 percent. A cost comparison is provided in Table 8.[38] Other costs expected with the LID design were a $900 initial cost for homeowner education with $170 required annually thereafter. Annual maintenance costs for the LID design (not included above) were expected to be $600 more than those for the conventional design, but a $3,000 annual savings in the stormwater utility bill was expected to more than offset higher maintenance costs.

Table 8. Cost Comparison for Garden Valley Subdivision[39]

Item	Conventional Development Cost	Garden Valley LID Cost	Cost Savings*	Percent Savings*
Stormwater management	$214,000	$59,800	$154,200	72%
Site paving	$110,400	$200,900	–$90,500	–82%
Total	**$324,400**	**$260,700**	**$63,700**	—

* Negative values denote increased cost for the LID design over conventional development costs.

The design incorporated the use of narrower roadways coupled with Grasscrete parking along the roadside, which increased the overall site paving costs. However, this added cost was more than offset by the savings realized by employing LID for stormwater management. The LID practices were expected to increase infiltration and reduce stormwater discharge rates, which can improve the health and quality of receiving streams.

KENSINGTON ESTATES, PIERCE COUNTY, WASHINGTON (A MODELING STUDY)

A study was undertaken to evaluate the use of LID techniques at the Kensington Estates subdivision, a proposed 24-acre development consisting of single-family homes on 103 lots. The study assumed that conventional stormwater management practices would be replaced entirely by LID techniques, including reduced imperviousness, soil amendments, and bioretention areas. The design dictated that directly connected impervious areas on-site were to be minimized. Three wetlands and an open space tract would treat stormwater discharging from LID installations. Open space buffers were included in the design. The LID proposal also included rooftop rainwater collection systems on each house.[40,41]

The proposed LID design reduced effective impervious area from 30 percent in the conventional design to approximately 7 percent, and it was approximately twice as expensive as the traditional design. A cost comparison is provided in Table 9.

Table 9. Cost Comparison for Kensington Estates Subdivision[42]

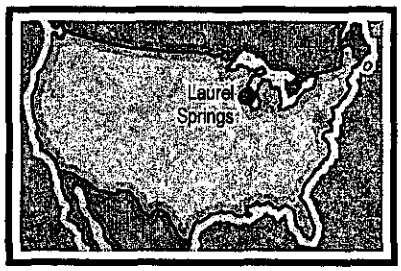
Item	Conventional Development Cost	Kensington Estate LID Cost	Additional Cost
Stormwater management	$243,400	$925,400	$ 682,000
Site paving	$522,300	$577,500	$55,200
Total	**$765,700**	**$1,502,900**	**$737,200**

Although the study assumed that roadways in the LID design would be narrower than those in the conventional design, site paving costs increased because the LID design assumed that Grasscrete parking would be included along the roadside to allow infiltration. The use of Grasscrete increased the overall site paving costs.

The avoidance of conventional stormwater infrastructure with the use of LID afforded significant cost savings. The LID measures eliminated the need for a detention pond and made more lots available for development. The significant cost for the rooftop rainwater collection systems was assumed to be offset somewhat by savings on stormwater utility bills.[43]

The study also anticipated that the use of LID would reduce stormwater peak flow discharge rates and soil erosion. Furthermore, greater on-site infiltration increases ground water recharge, resulting in increased natural baseflows in streams and a reduction in dry channels. Proposed clustering of buildings would allow wetlands and open space to be preserved and create a more walkable community. The reduced road widths were anticipated to decrease traffic speeds and accident rates.

LAUREL SPRINGS SUBDIVISION, JACKSON, WISCONSIN



The Laurel Springs subdivision in Jackson, Wisconsin, is a residential subdivision that was developed as a conservation design community. The use of cluster design helped to preserve open space and minimize grading and paving. The use of bioretention and vegetated swales lowered the costs for stormwater management.

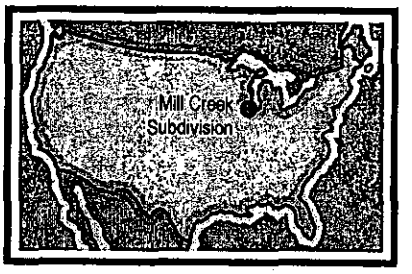
The costs of using conservation design to develop the subdivision were compared with the estimated cost of developing the site with conventional practices (Table 10).[44] The total savings realized with conservation design were just over $504,469, or approximately 30 percent of the estimated conventional construction cost. Savings from stormwater management accounted for 60 percent of the total cost savings. Other project savings were realized with reduced sanitary sewer, water distribution, and utility construction costs.

Table 10. Cost Comparison for Laurel Springs Subdivision[45]

Item	Conventional Development Cost	Laurel Springs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$441,600	$342,000	$99,600	23%	20%
Stormwater management	$439,956	$136,797	$303,159	69%	60%
Site paving and sidewalks	$607,465	$515,755	$91,710	15%	18%
Landscaping	$165,000	$155,000	$10,000	6%	2%
Total	**$1,654,021**	**$1,149,552**	**$504,469**	—	—

In addition to preserving open space and reducing the overall amount of clearing and grading, the cluster design also reduced street lengths and widths, thereby lowering costs for paving and sidewalks. Vegetated swales and bioswales largely were used to replace conventional stormwater infrastructure and led to significant savings. Each of these factors helped to contribute to a more hydrologically functional site that reduced the total amount of stormwater volume and managed stormwater through natural processes.

MILL CREEK SUBDIVISION, KANE COUNTY, ILLINOIS



The Mill Creek subdivision is a 1,500-acre, mixed-use community built as a conservation design development. Approximately 40 percent of the site is identified as open space; adjacent land use is mostly agricultural. The subdivision was built using cluster development. It uses open swales for stormwater conveyance and treatment, and it has a lower percentage of impervious surface than conventional developments. An economic analysis compared the development cost for 40 acres of Mill Creek with the development costs of 30 acres of a conventional development with similar building density and location.[46]

When compared with the conventional development, the conservation site design techniques used at Mill Creek saved approximately $3,411 per lot. Nearly 70 percent of these savings resulted from reduced costs for stormwater management, and 28 percent of the savings were found in reduced costs for site preparation. A cost comparison is provided in Table 11. Other savings not included in the table were realized with reduced construction costs for sanitary sewers and water distribution.

Table 11. Cost Comparison for Mill Creek Subdivision[47]

Item	Conventional Development Cost per Lot	Mill Creek LID Cost per Lot	Cost Savings per Lot	Percent Savings per Lot	Percent of Total Savings
Site preparation	$2,045	$1,086	$959	47%	28%
Stormwater management	$4,535	$2,204	$2,331	51%	68%
Site paving and sidewalks	$5,930	$5,809	$121	2%	4%
Total	**$12,510**	**$9,099**	**$3,411**	—	—

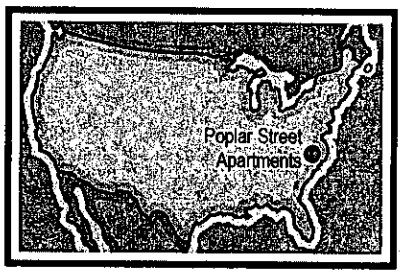
The use of cluster development and open space preservation on the site decreased site preparation costs. The majority of the cost savings were achieved by avoiding the removal and stockpiling of topsoil. In addition to cost savings from avoided soil disturbance, leaving soils intact also retains the hydrologic function of the soils and aids site stormwater management by reducing runoff volumes and improving water quality. The site's clustered design was also responsible for a decrease in costs for paving and sidewalks because the designers intentionally aimed to decrease total road length and width.

The designers used open swales as the primary means for stormwater conveyance. Coupled with other site techniques to reduce runoff volumes and discharge rates, significant savings in stormwater construction were avoided because of reduced storm sewer installation; sump pump connections; trench backfill; and catch basin, inlet, and cleanout installation.

In addition to the cost savings, the conservation design at Mill Creek had a positive effect on property values: lots adjacent to walking/biking trails include a $3,000 premium, and lots adjacent to or with views of open space include a $10,000 to $17,500 premium. The

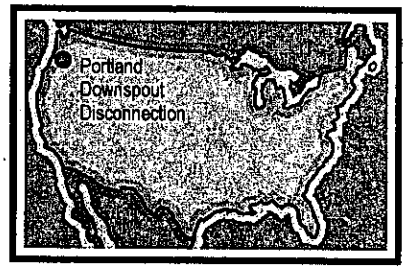
600 acres of open space on the site include 127 acres of forest preserve with quality wetlands, 195 acres of public parks, and 15 miles of walking/biking trails.[48]

POPLAR STREET APARTMENTS, ABERDEEN, NORTH CAROLINA



The use of bioretention, topographical depressions, grass channels, swales, and stormwater basins at the 270-unit Poplar Street Apartment complex improved stormwater treatment and lowered construction costs. The design allowed almost all conventional underground storm drains to be eliminated from the design. The design features created longer flow paths, reduced runoff volume, and filtered pollutants from runoff. According to the U.S. Department of Housing and Urban Development, use of LID techniques resulted in a $175,000 savings (72 percent).[49]

PORTLAND DOWNSPOUT DISCONNECTION PROGRAM, PORTLAND, OREGON

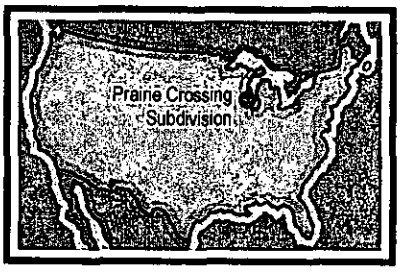


The City of Portland, Oregon, implemented a Downspout Disconnection Program as part of its CSO elimination program. Every year, billions of gallons of stormwater mixed with sewage pour into the Willamette River and Columbia Slough through CSOs. When roof runoff flows into Portland's combined sewer system, it contributes to CSOs. The City has reduced the frequency of CSOs to the Columbia Slough and hopes to eliminate 94 percent of the overflows to the Willamette River by 2011.[50]

The Downspout Disconnection Program gives homeowners, neighborhood associations, and community groups the chance to work as partners with the Bureau of Environmental Services and the Office of Neighborhood Involvement to help reduce CSOs. Residents of selected neighborhoods disconnect their downspouts from the combined sewer system and allow their roof water to drain to gardens and lawns. Residents can do the work themselves and earn $53 per downspout, or they can have community groups and local contractors disconnect for them. Community groups earn $13 for each downspout they disconnect. (Materials are provided by the City.)

More than 44,000 homeowners have disconnected their downspouts, removing more than 1 billion gallons of stormwater per year from the combined sewer system. The City estimates that removing the 1 billion gallons will result in a $250 million reduction in construction costs for an underground pipe to store CSOs by reducing the capacity needed to handle the flows. The City has spent $8.5 million so far to implement this program and will continue to encourage more homeowners and businesses to disconnect their downspouts to achieve additional CSO and water quality benefits.

PRAIRIE CROSSING SUBDIVISION, GRAYSLAKE, ILLINOIS



The Prairie Crossing subdivision is a conservation development on 678 acres, of which 470 acres is open space. The site was developed as a mixed-use community with 362 residential units and 73 acres of commercial property, along with schools, a community center, biking trails, a lakefront beach, and a farm. The site uses bioretention cells and vegetated swales to manage stormwater.[51]

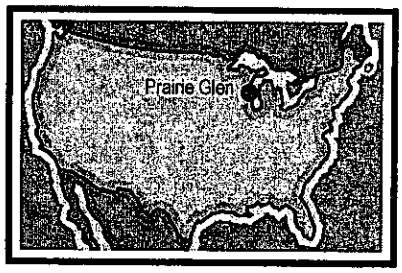
A cost analysis was performed to compare the actual construction costs of Prairie Crossing with the estimated costs of a conventional design on the site with the same layout. Cost savings with conservation design were realized primarily in four areas: stormwater management, curb and gutter installation, site paving, and sidewalk installation. The total savings were estimated to be almost $1.4 million, or nearly $4,000 per lot (Table 12). Savings from stormwater management accounted for approximately 15 percent of the total savings. The cost savings shown are relative to the estimated construction cost for the items in a conventional site design based on local codes and standards.

Table 12. Cost Comparison for Prairie Crossing Subdivision[52]

Item	Cost Savings	Percent Savings
Reduced Road Width	$178,000	13%
Stormwater Management	$210,000	15%
Decreased Sidewalks	$648,000	47%
Reduced Curb and Gutter	$339,000	25%
Total	**$1,375,000**	—

Reduced costs for sidewalks accounted for nearly half of the total cost savings. This savings is attributed in part to the use of alternative materials rather than concrete for walkways in some locations. In addition, the design and layout of the site, which retained a very high percentage of open space, contributed to the cost savings realized from reducing paving, the length and number of sidewalks, and curbs and gutters. The use of alternative street edges, vegetated swales, and bioretention and the preservation of natural areas all reduced the need for and cost of conventional stormwater infrastructure.[53] Benefits are associated with the mixed-use aspect of the development as well: residents can easily access schools, commercial areas, recreation, and other amenities with minimal travel. Proximity to these resources can reduce traffic congestion and transportation costs. Also, mixed-use developments can foster a greater sense of community and belonging than other types of development. All of these factors tend to improve quality of life.

PRAIRIE GLEN SUBDIVISION, GERMANTOWN, WISCONSIN



The Prairie Glen subdivision is nationally recognized for its conservation design approach. A significant portion of the site (59 percent) was preserved as open space. Wetlands were constructed to manage stormwater runoff, and the open space allowed the reintroduction of native plants and wildlife habitat. The site layout incorporated hiking trails, which were designed to allow the residents to have easy access to natural areas.[54]

To evaluate the cost benefits of Prairie Glen's design, the actual construction costs were compared with the estimated costs of developing the site conventionally. When compared with conventional design, the conservation design at Prairie Glen resulted in a savings of nearly $600,000. Savings for stormwater management accounted for 25 percent of the total savings. Table 13 provides a cost comparison. Other savings not included in the table were realized with reduced sanitary sewer, water distribution, and utility construction costs.

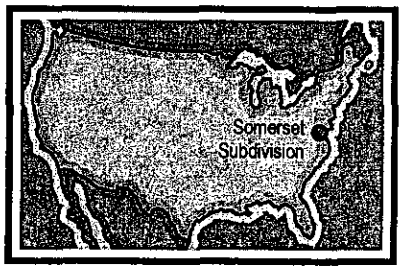
Table 13. Cost Comparison for Prairie Glen Subdivision[55]

Item	Conventional Development Cost	Prairie Glen LID Cost	Cost Savings*	Percent Savings*	Percent of Total Savings*
Site preparation	$277,043	$188,785	$88,258	32%	22%
Stormwater management	$215,158	$114,364	$100,794	47%	25%
Site paving and sidewalks	$462,547	$242,707	$219,840	48%	54%
Landscaping	$50,100	$53,680	–$3,580	–7%	–1%
Total	**$1,004,848**	**$599,536**	**$405,312**	—	—

* Negative values denote increased cost for the LID design over conventional development costs.

The cluster design and preservation of a high percentage of open space resulted in a significant reduction in costs for paving and sidewalks. These reduced costs accounted for 54 percent of the cost savings for the overall site. Reduced costs for soil excavation and stockpiling were also realized. The use of open-channel drainage and bioretention minimized the need for conventional stormwater infrastructure and accounted for the bulk of the savings in stormwater management. Landscaping costs increased due to the added amount of open space on the site.

SOMERSET SUBDIVISION, PRINCE GEORGE'S COUNTY, MARYLAND



The Somerset subdivision, outside Washington, D.C., is an 80-acre site consisting of nearly 200 homes. Approximately half of the development was built using LID techniques; the other half was conventionally built using curb-and-gutter design with detention ponds for stormwater management. Bioretention cells and vegetated swales were used in the LID portion of the site to replace conventional stormwater infrastructure. Sidewalks were also eliminated from the design. To address parking concerns, some compromises were made: because of local transportation department concern that roadside parking would damage the swales, roads were widened by 10 feet.[56] (Note that there are alternative strategies to avoid increasing impervious surface to accommodate parking, such as installing porous pavement parking lanes next to travel lanes.)

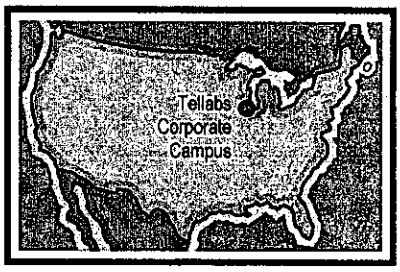
Most of the 0.25-acre lots have a 300- to 400-square-foot bioretention cell, also called a rain garden. The cost to install each cell was approximately $500—$150 for excavation and $350 for plants. The total cost of bioretention cell installation in the LID portion of the site was $100,000 (swale construction was an additional cost). The construction cost for the detention pond in the conventionally designed portion of the site was $400,000, excluding curbs, gutters, and sidewalks.[57,58] By eliminating the need for a stormwater pond, six additional lots could be included in the LID design. A comparison of the overall costs for the traditional and LID portions of the site is shown in Table 14.

Table 14. Cost Comparison for Somerset Subdivision

Conventional Development Cost	Somerset LID Cost	Cost Savings	Percent Savings	Savings per Lot
$2,456,843	$1,671,461	$785,382	32%	$4,000

In terms of environmental performance, the LID portion of the subdivision performed better than the conventional portion.[59] A paired watershed study compared the runoff between the two portions of the site, and monitoring indicated that the average annual runoff volume from the LID watershed was approximately 20 percent less than that from the conventional watershed. The number of runoff-producing rain events in the LID watershed also decreased by 20 percent. Concentrations of copper were 36 percent lower; lead, 21 percent lower; and zinc, 37 percent lower in LID watershed runoff than in conventional watershed runoff. The homeowners' response to the bioretention cells was positive; many perceived the management practices as a free landscaped area.

TELLABS CORPORATE CAMPUS, NAPERVILLE, ILLINOIS



The Tellabs corporate campus is a 55-acre site with more than 330,000 square feet of office space. After reviewing preliminary planning materials that compared the costs of conventional and conservation design, the company chose to develop the site with conservation design approaches. Because the planning process included estimating costs for the two development approaches, this particular site provides good information on commercial/industrial use of LID.[60]

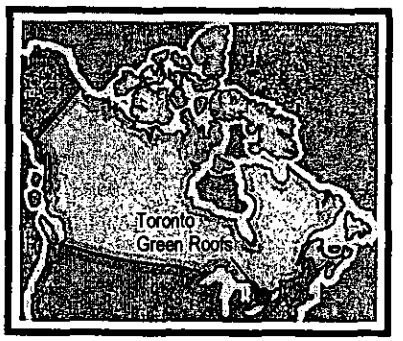
Development of the site included preserving trees and some of the site's natural features and topography. For stormwater management, the site uses bioswales, as well as other infiltration techniques, in parking lots and other locations. The use of LID techniques for stormwater management accounted for 14 percent of the total cost savings for the project. A cost comparison is provided in Table 15. Other cost savings not shown in Table 15 were realized with reduced construction contingency costs, although design contingency costs were higher.

Table 15. Cost Comparison for Tellabs Corporate Campus[61]

Item	Conventional Development Cost	Tellabs LID Cost	Cost Savings	Percent Savings	Percent of Total Savings
Site preparation	$2,178,500	$1,966,000	$212,500	10%	46%
Stormwater management	$480,910	$418,000	$62,910	13%	14%
Landscape development	$502,750	$316,650	$186,100	37%	40%
Total	**$3,162,160**	**$2,700,650**	**$461,510**	—	—

Savings in site preparation and landscaping had the greatest impact on costs. Because natural drainage pathways and topography were maintained to the greatest extent possible, grading and earthwork were minimized; 6 fewer acres were disturbed using the conservation design approach. Landscaping at the site maximized natural areas and restored native prairies and wetland areas. The naturalized landscape eliminated the need for irrigation systems and lowered maintenance costs when compared to turf grass, which requires mowing and regular care. In the end, the conservation approach preserved trees and open space and provided a half acre of wetland mitigation. The bioswales used for stormwater management complemented the naturalized areas and allowed the site to function as a whole; engineered stormwater techniques augmented the benefits of the native areas and wetlands.[62]

TORONTO GREEN ROOFS, TORONTO, ONTARIO (A MODELING STUDY)



Toronto is home to more than 100 green roofs. To evaluate the benefits of greatly expanded use of green roofs in the city, a study was conducted using a geographic information system to model the effects of installing green roofs on all flat roofs larger than 3,750 square feet. (The model assumed that each green roof would cover at least 75 percent of the roof area.) If the modeling scenario were implemented, 12,000 acres of green roofs (8 percent of the City's land area) would be installed.[63] The study quantified five primary benefits from introducing the green roofs: (1) reduced stormwater flows into the separate storm sewer system, (2) reduced stormwater flows into the combined sewer system, (3) improved air quality, (4) mitigation of urban heat island effects, and (5) reduced energy consumption.[64]

The study predicted economic benefits of nearly $270 million in municipal capital cost savings and more than $30 million in annual savings. Of the total savings, more than $100 million was attributed to stormwater capital cost savings, $40 million to CSO capital cost savings, and nearly $650,000 to CSO annual cost savings. The cost of installing the green roofs would be largely borne by private building owners and developers; the cost to Toronto would consist of the cost of promoting and overseeing the program and would be minimal. Costs for green roof installations in Canada have averaged $6 to $7 per square foot. The smallest green roof included in the study, at 3,750 square feet, would cost between $22,000 and $27,000. The total cost to install 12,000 acres of green roofs would be $3 billion to $3.7 billion.[65,66] Although the modeled total costs exceed the monetized benefits, the costs would be spread across numerous private entities.

CONCLUSION

The 17 case studies presented in this report show that LID practices can reduce project costs and improve environmental performance. In most cases, the case studies indicate that the use of LID practices can be both fiscally and environmentally beneficial to communities. As with almost all such projects, site-specific factors influence project outcomes, but in general, for projects where open space was preserved and cluster development designs were employed, infrastructure costs were lower. In some cases, initial costs might be higher because of the cost of green roofs, increased site preparation costs, or more expensive landscaping practices and plant species. However, in the vast majority of cases, significant savings were realized during the development and construction phases of the projects due to reduced costs for site grading and preparation, stormwater infrastructure, site paving, and landscaping. Total capital cost savings ranged from 15 to 80 percent when LID methods were used, with a few exceptions in which LID project costs were higher than conventional stormwater management costs.

EPA has identified several additional areas that will require further study. First, in all the cases, there were benefits that this study did not monetize and factor into the project's bottom line. These benefits include improved aesthetics, expanded recreational opportunities, increased property values due to the desirability of the lots and their proximity to open space, increased number of total units developed, the value of increased marketing potential, and faster sales.

Second, more research is also needed to quantify the environmental benefits that can be achieved through the use of LID techniques and the costs that can be avoided by using these practices. For example, substantial downstream benefits can be realized through the reduction of the peak flows, discharge volumes, and pollutant loadings discharged from the site. Downstream benefits also might include reductions in flooding and channel degradation, costs for water quality improvements, costs of habitat restoration, costs of providing CSO abatement, property damage, drinking water treatment costs, costs of maintaining/dredging navigable waterways, and administrative costs for public outreach and involvement.

Finally, additional research is needed monetize the cost reductions that can be achieved through improved environmental performance, reductions in long-term operation and maintenance costs and/or reductions in the life cycle costs of replacing or rehabilitating infrastructure.

---

[1] D. Beach, *Coastal Sprawl: The Effects of Urban Design on Aquatic Ecosystems in the United States* (Arlington, VA: Pew Ocean Commission, 2002).

[2] USDA, *Summary Report: 1997 National Resources Inventory* (Washington, DC: U.S. Department of Agriculture, Natural Resources Conservation Service, 1999 [revised 2000]).

[3] Beach, 2002.

[4] The term *LID* is one of many used to describe the practices and techniques employed to provide advanced stormwater management; *green infrastructure*, *conservation design*, and *sustainable stormwater management* are other common terms. However labeled, each of the

identified practices seeks to maintain and use vegetation and open space, optimize natural hydrologic processes to reduce stormwater volumes and discharge rates, and use multiple treatment mechanisms to remove a large range of pollutants. In the context of this report, case studies ascribing to one of the above, or similar, labels were evaluated, and these terms are used interchangeably throughout the report.

[5] Trust for Public Land, *The Economic Benefits of Open Space* (Trust for Public Land, 1999), http://www.tpl.org/tier3_cd.cfm?content_item_id=1195&folder_id=727 (accessed March 29, 2006).

[6] Trust for Public Land and American Water Works Association. *Protecting the Source* (San Francisco, CA: Trust for Public Land, 2004).

[7] Riverkeeper, *Sustainable Raindrops: Cleaning New York Harbor by Greening The Urban Landscape* (accessed Nov. 30, 2007).

[8] Trust for Public Land, 1999.

[9] USEPA, *Economic Benefits of Runoff Controls* (Washington, DC: U.S. Environmental Protection Agency, Office of Water, 1995).

[10] National Park Service, *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors: A Resource Book* (National Park Service, 1995), http://www.nps.gov/pwro/rtca/econindx.htm (accessed June 1, 2006).

[11] USEPA, *Preliminary Data Summary of Urban Stormwater Best Management Practices*, EPA-821-R-99-012 (Washington, DC: U.S. Environmental Protection Agency, 1999), http://www.epa.gov/OST/stormwater (accessed March 1, 2006).

[12] Water Environment Federation, Credits Bring Economic Incentives for Onsite Stormwater Management, *Watershed & Wet Weather Technical Bulletin* (January 1999).

[13] C. Kloss and C. Calarusse, *GI Report* (New York, NY:, Natural Resources Defense Council, April 2006).

[14] R.R. Horner, H. Lim, and S.J. Burges, *Hydrologic Monitoring of the Seattle Ultra-Urban Stormwater Management Projects: Summary of the 2000–2003 Water Years*, Water Resources Series: Technical Report No. 181 (Seattle, WA: University of Washington, Department of Civil and Environmental Engineering, 2004), http://www.ci.seattle.wa.us/util/stellent/groups/public/@spu/@esb/documents/webcontent/hydrologic_200406180904017.pdf. (accessed November 19, 2007).

[15] J. Haugland, *Changing Cost Perceptions: An Analysis of Conservation Development* (Elmhurst, IL: Conservation Research Institute, 2005), http://www.nipc.org/environment/sustainable/conservationdesign/cost_analysis (accessed March 1, 2006).

[16] Horner et al., 2004.

[17] Horner et al., 2004.

[18] Haugland, 2005.

[19] Haugland, 2005.

[20] Haugland, 2005.

[21] Puget Sound Action Team, *Reining in the Rain: A Case Study of the City of Bellingham's Use of Rain Gardens to Manage Stormwater* (Puget Sound Action Team, 2004), www.psat.wa.gov/Publications/Rain_Garden_book.pdf (accessed September 11, 2007).

[22] Puget Sound Action Team, 2004.

[23] Friends of the Rappahannock, *Example LID Commercial Re-designs* and *Costs Spreadsheets for Re-designs* (Friends of the Rappahannock, 2006), http://www.riverfriends.org/Publications/LowImpactDevelopment/tabid/86/Default.aspx. (accessed November 19, 2007).

[24] C.S. Ingles, Stafford County Helps Pioneer Low Impact Design Movement, *Virginia Town & City* 39, no. 8 (2004).

[25] Ingles, 2004.

[26] Kloss and Calarusse, 2006.

[27] A. Steed, *Naturalized Streetscapes: A Case Study of Crown Street, Vancouver* (City of Vancouver Greenways, Vancouver, BC: City of Vancouver Greenways, no date), http://www.sustainability.ca/Docs/Naturalized%20Streetscapes-AS.pdf?CFID=19075623&CFTOKEN=60214114 (accessed March 31, 2006).

[28] Personal communication with Otto Kauffmann, Engineering Project Coordinator, City of Vancouver Streets Division, April 2005.

[29] Scott Deveau, Street in for Crowning Touch, *The Vancouver Courier* (September 22, 2004) http://spec.bc.ca/article/article.php?articleID=340 (accessed March 9, 2005).

[30] American dollars converted from Canadian equivalent based on April 25, 2005, exchange rate.

[31] City of Vancouver, British Columbia, *Crown Street: Vancouver's First Environmentally Sustainable Street* (City of Vancouver, BC, 2005), prepared for TAC's Environmental Council, Vancouver, BC, http://www.transportationassociation.ca/english/pdf/conf2005/s5/kauffman.pdf (accessed November 19, 2007).

[32] Personal communication with Otto Kauffmann, Engineering Project Coordinator, City of Vancouver Streets Division, November 2005.

[33] Kloss and Calarusse, 2006.

[34] Personal communication with David Yurkovich, Greenways Landscape Designer, City of Vancouver Greenways, April 2005.

[35] Haugland, 2005.

[36] HUD, *The Practice of Low Impact Development (LID)* (Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research, 2003), http://www.huduser.org/Publications/PDF/practLowImpctDevel.pdf (accessed March 1, 2006).

[37] Haugland, 2005.

[38] CH2MHill, *Pierce County Low Impact Development Study—Final Report* (Belleview, WA: CH2MHill, 2001), http://www.co.pierce.wa.us/xml/services/home/environ/water/CIP/LID/final-lid-report.pdf (accessed March 1, 2006).

[39] CH2MHill, 2001.

[40] USEPA, Low-Impact Development Pays Off, *Nonpoint Source News-Notes* 75 (May 2005): 7–10, http://www.epa.gov/owow/info/NewsNotes/issue75/75issue.pdf (accessed March 1, 2006).

[41] CH2MHill, 2001.

[42] CH2MHill, 2001.

[43] CH2MHill, 2001.

[44] Haugland, 2005.

[45] Haugland, 2005.

[46] Haugland, 2005.

[47] Haugland, 2005.

[48] Haugland, 2005.

[49] HUD, 2003.

[50] Portland Bureau of Environmental Services, *Downspout Disconnection Program* (Portland, OR: Portland Bureau of Environmental Services, 2006), http://www.portlandonline.com/bes/index.cfm?c=31246 (accessed March 31, 2006).

[51] Haugland, 2005.

[52] Haugland, 2005.

[53] Haugland, 2005.

[54] Haugland, 2005.

[55] Haugland, 2005.

[56] USEPA, Maryland Developer Grows "Rain Gardens" to Control Residential Runoff, *Nonpoint Source News-Notes* 42 (August/September 1995), http://www.epa.gov/owow/info/NewsNotes/pdf/42issue.pdf (accessed March 1, 2006).

[57] USEPA, 2005.

[58] HUD, 2003.

[59] USEPA, 2005.

[60] Haugland, 2005.

[61] Haugland, 2005.

[62] Haugland, 2005.

[63] D. Banting, H. Doshi, J. Li, P. Missios, A. Au, B.A. Currie, and M. Verrati, *Report on the Environmental Benefits and Costs of Green Roof Technology for the City of Toronto* (Toronto, ON: City of Toronto and Ontario Centres of Excellence—Earth and Environmental Technologies, 2005), http://www.toronto.ca/greenroofs/pdf/fullreport103105.pdf (accessed December 16, 2005).

[64] Kloss and Calarusse, 2006.

[65] American dollars converted from Canadian equivalent based on December 19, 2005, exchange rate.

[66] Banting et al., 2005.

EXHIBIT 310

DOCKET
09-AFC-6
DATE
RECD. FEB 22 2010

LIN PORTER
4330 WISE RD # 12
BULLHEAD CITY, ARIZONA 86426
Phone (928) 715-0470
Fax (928) 758-4880
BHCLIN@YAHOO.COM

RE: BLYTHE SOLAR POWER PROJECT
DOCKET (09-AFC-6)

CALIFORNIA ENERGY COMMISSION
ALAN SOLOMON, ENERGY COMMISSION PROJECT MANAGER
1516 NINTH STREET
SACRAMENTO, CALIFORNIA 95814-5512
ASOLOMON@ENERGY.STATE.CA.US

DEAR MR SOLOMON

I OWN PROPERTY IN BLYTHE CALIFORNIA- PARCEL # 818180001-5, (160.54 ACRES) I WAS CONTACTED BY AECOM ENVIROMENT ON FEBUARY 23, 2009 ON BEHALF OF SOLAR MILLENNIUM REQUESTING ACCESS TO MY PROPERTY FOR THE PURPOSE OF CONDUCTING BIOLOGICAL AND ARCHAEOLOGICAL SURVEYS IN CONJUNCTION WITH THE PPROJECT. I AGREED TO ALOW THEM TO ENTER MY PROPERTY THROUGH JULY 2009

I CALLED SOLOR MILLENNIUM IN THE 2ND WEEK OF MAY 2009 TO DISCUSS THE PLOT PLAN OF THE PROPOSED PROJECT WHICH THAY SENT TO ME. AT THAT TIME I WAS TOLD MY PROPERTY WAS NOT IN THE PROJECT OR BUFFER AREA. I POINTED OUT THEY HAD NOT INCLUDED PARCEL NUMBERS ON THE PLAN AND I HAD DONE SOME CHECKING WITH THE COUNTY RECORDERS WEB SITE AND FOUND I WAS INDEED IN THE PROJECT, AS A MATTER OF FACT I COULD SEE A DOTTED LINE OF A PROPOSED BUILDING SITE ON THE MAJOR PORTION OF MY PROPERTY. I WAS THEN CONTACTED BY PATRICK JORDAN OF WINDEMERE REAL ESTATE OUT OF PALM SPRINGS, HE SET UP A MEETING WITH HIMSELF AND GAVIN BERG SENIOR PROJECT MANAGER WITH SOLAR MILLENNIUM ON MAY 13,2009 AT MY OFFICE IN BULLHEAD CITY. AFTER THE MEETING ON MAY 21,2009 I RECEIVED A PROPOSAL FOR A PURCHASE OPTION FOR FIVE YEARS (5) AT $5,OOO.OO PER YEAR, THE PURCHASE PRICE ON THE OPTION WOULD BE BASED ON A VALUE OF $2,100.00 PER ACRE.

I TURNED DOWN THIS OFFER AS I HAVE A PROPOSED PROJECT ON THIS PROPERTY WHICH I HAVE ALREADY SPENT OVER $200,000.00 ON ENGINEERING, SOIL TESTING, PERK TEST AND HYDRLOGY TESTS FOR WELL WATER. WE ARE NOT READY TO SUBMIT PLANS FOR PERMITS OR MOVE FORWARD UNTILL WE CAN SEE A UPSWING IN THE ECONOMY.

I HAVE RECEIVED YOUR NOTICESES OF A STAFF WORKSHOP IN SACRAMENTO CALIFORNIA, ALTHOUGH I WIOULD LIKE TO ATTENED ALL OF THE MEETINGS BUT IT IS A LONG WAY TO TRAVEL. SO I WOULD LIKE TO VOICE MY OPENION BY

PROXY. I CAN NOT UNDERSTAND HOW THEY CAN MOVE FORWARD WITH THIS PROJECT WITHOUT FIRST HAVING ALL PROPERTY OWNERS AFFECTED AGREEING TO TERMS. I PROTEST TO THIS PROJECT EVEN IF THE FOOTPRINT WERE MOVED NOT TO INCLUDE MY PROPERTY UNLESS IT WAS FAR ENOUGH AWAY AS TO NOT AFFECT MY PROJECT. I AM CONCERNED WITH GLARE FROM SOLAR REFLECTERS
AND THE NOISE OF TURBINS AND PUMPS.

I WOULD LIKE AN UP TO DATE SITE PLAN OF THE PROJECT ALONG WITH PARCEL NUMBERS, IF YOU CAN NOT SUPPLY ME WITH THIS MAYBY YOU COULD STEER ME THE RIGHT DIRECTION SO I CAN AQUIRE THIS IMFORMATION.

INCLUDED IS THE PLAN SOLAR MILLENNIUM SENT TO ME, I HAVE OUTLINED MY PROPERTY.

Sincerely,

LIN PORTER

CC: SOLAR MILLENNIUM
RICHARD BASINGER
PATRICK JORDAN
BLM/ ENERGY COMMISSION-ALLISON SHAFFER

February 19, 2010, 3:03 PM

FROM: LIN PORTER
4330 WISE RD # 12
BULLHEAD CITY, ARIZONA 86426
PHONE: (928) 715-0470
FAX: (928) 758-4880
E-MAIL BHCLIN@YAHOO.COM

RE: BLYTHE SOLAR POWER PROJECT
ASSESSOR PARCEL # 818180001-5
RIVERSIDE COUNTY, CALIFORNIA

TO: SOLAR MILLENNIUM, LLC
1625 SHATTUCK AVE., SUITE 270
BERKELEY, CA 94709
PHONE: (510) 809-4660

DEAR ALL CONCERNED WITH THE BLYTHE SOLAR POWER PROJECT AT SOLAR MILLENNIUM.

THIS IS THE 2ND LETTER FROM ME TO SOLAR MILLINNIUM IN REGARDS TO MY PROPERTY, THE PREVIOUS LETTER WAS SENT TO GAVIN BERG WITH NO RESPONSE. MY CONCERNES ARE AS FOLLOWES:

I AM INCLUDING A LETTER SENT TO ME FROM GAVIN BERG SENIOR PROJECT MANAGER SOLAR MILLINNIUM. I DID NOT AGREE TO THE OPTION OR ACCEPT THE $5,000.00 PER YEAR OFFER.

THIS WAS SENT TO ME SHORTLY AFTER I HAD A MEETING WITH HIM AND PATRICK JORDEN OF PATRICK STERWART PROPERTIES. I RESPONDED TO HIS PROPOSAL BY CONTACTING PATRICK JORDEN AND DECLINING THE OFFER GAVIN BERG HAD SENT. I AM ALSO INCLUDING TWO SITE PLANES, THE SITE PLAN BPSS WAS SENT TO ME BY SOLAR MILLINNIUM IN THE VERY BEGINNING.I CALLED AND THEY ASSURED ME I WAS NOT IN THE PROJECT AT WHICH TIME I ASKED THEM WHY THAY HAD NO PARCEL NUMBERS ON THE PLAN, I WAS TOLD THEY WERE NOT SURE.

AFTER SPEAKING TO THEM I WENT TO THE COUNTY ASSESSORS WEB SITE AND DETERMINED WHERE I WAS ON THEIR SITE PLAN (I HAVE HIGHLIGHTED MY PROPERTY WHICH WAS IN FACT INSIDE THE PROJECT) I RECEIVED THE 2ND SITE PLAN AT THE CEC SITE VISIT, JAN 2010 WHICH INDICATED THAT WE WERE TO VISIT THE SITE WHICH DID NOT COME TO BE, WE WERE TAKEN TO THE SURFACE ROAD NEXT TO I-10 ,NOT ON TO THE SITE, DON'T UNDERSTAND THE VALUE IN THAT, I HAVE SEEN I-10 BEFORE. PLEASE NOTICE WHAT HAS BEEN DONE WITH THE BOUNDRY LINES, IN PARTICULAR AROUND MY PROPERTY. NOTE THAT I AM NOW

OUTSIDE THE BOUNDRY LINES, NICE TRY GUYS.

FOR ALL INTENT AND PURPOSES I AM MOST CERTIAINLY IN THE THICK OF THIS PROJECT UNLESS
I'M MISSING SOMETHING. IN YOUR PROJECT DISCRIPTION YOU SAY THE BLYTHE SOLAR POWER PLANT WILL BE LOCATED ON BUREAU OF LAND MANAGEMENT LAND TEN MILES WEST OF BLYTHE WITH NO MENTION OF PRIVATE LANDS, KIND OF MISLEADING TO SAY THE LEAST.

TO SUM IT UP, I DO NOT UNDERSTAND HOW THIS PROJECT HAS MOVED FORWARD AS IT HAS WITHOUT FIRST ADDRESSING ISSUES SUCH AS THIS. I AM NOW THINKING THIS SITUATION WAS NOT MADE AWARE OF TO THE GOVERNING REGULATING AGENCIES. THIS LETTER IS TO SERVE NOTICE THAT IF I AM NOT CONTACTED AND THIS PROBLEM IS NOT CLEARED UP, MY ONLY COURSE IS TO ENTER INTO A LAW SUTE WITH SOLAR MILLINNIUM AND UNFOURTUNITLY WITH ALL GOVERNING AGENCIES, ALTHOUGH AS I SEE IT THAY WERE NOT GIVEN THE WHOLE PICTURE WHEN YOU STARTED THE PERMITTING PROCESSES. THIS SITUATION IS NOT ACCEPTABLE IN ANY WAY SHAPE OR FORM , AS I SEE IT THE PERMITING PROCESSES SHOULD BE PUT ON HOLD UNTILL ALL ISSUES ARE ADDRESSED.

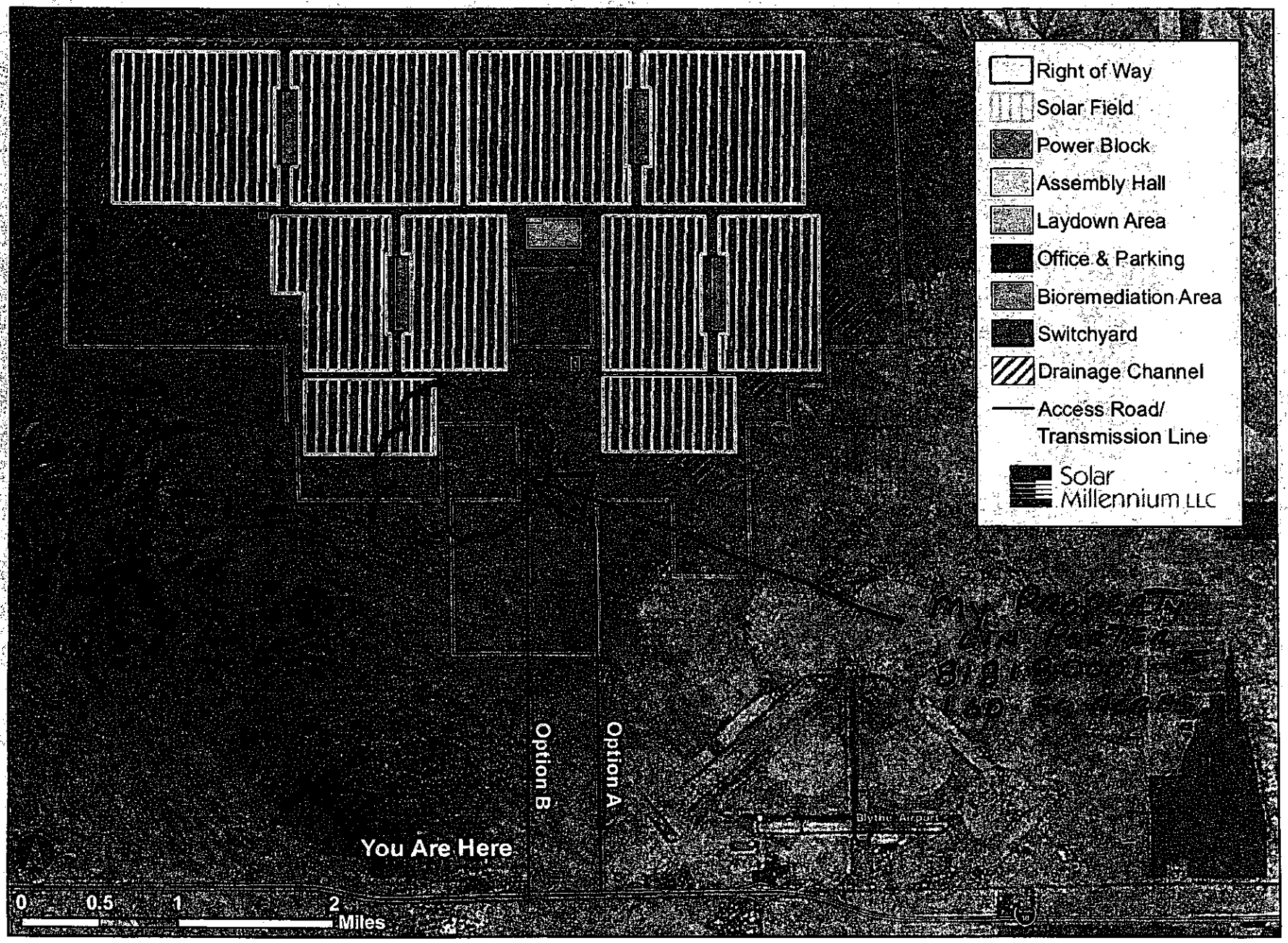
SINCERLEY

LIN PORTER

CC:

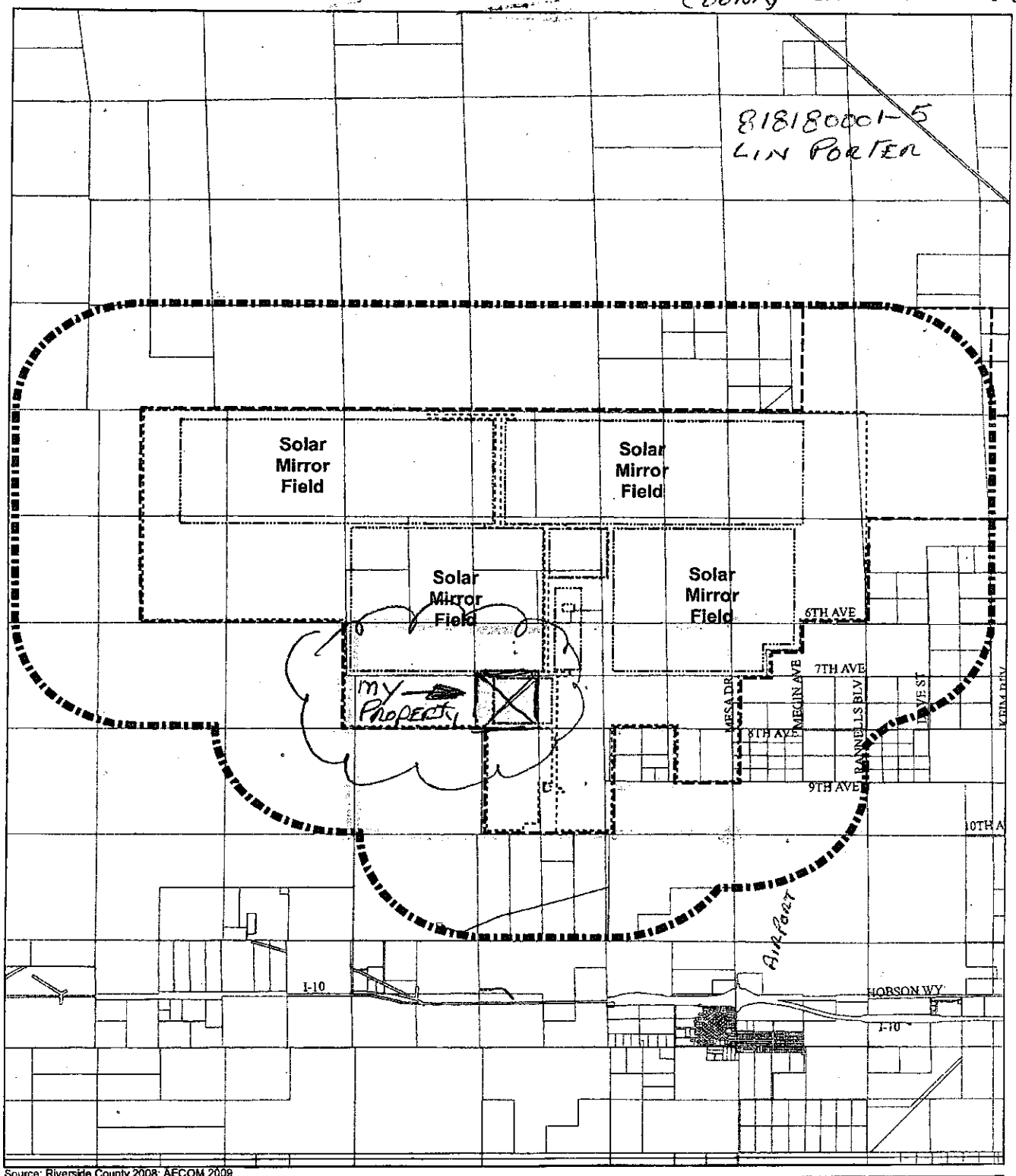
ALAN SOLOMON.-STAFF PROJECT MANAGER. CALIFORNIA ENERGY CIMMISSION
JAMES DAVIS. PUBLIC LIAISON
RAUOL RENAUD. HEARING OFFICE
HOLLY L. ROBERTS. PROJECT MANAGER, BLM
GAVIN BERG-SOLAR MILLENNIUM. SENIOR PROJECT MANAGER
ALICE HARRON-SOLAR MILLENNIUM. SENIOR DIRECTOR OF PROJECT DEVELOPMENT
RICHARD BASINGER.-ASSOCIATE
MEDIA OFFICE
ARRIE BACHRACH-PROJECT MANAGER

Blythe Solar Power Project



CEC Site Visit, Jan 2010

ASS ESSON - ~~Edgt~~ COUNTY CLARK RECORDER



Source: Riverside County 2008; AECOM 2009

1.25 0 1.25 Miles

Scale: 1:79,200; 1 Inch = 1.25 miles

LEGEND

- Survey Area
- Riverside Parcels (2008)
- Right of Way Boundary
- Proposed Fence
- Solar Facilities

Blythe Solar Power Plant (BSPP)

March 10, 2009

Lin B. & Kathleen Porter
4330 Wise Road, #12
Bullhead City, AZ 86426

Dear Lin & Kathleen Porter,

By now you have probably received a letter regarding environmental surveys that we are carrying out for a proposed solar project near Blythe where you own property.

We are in the process of engaging several landowners in a discussion about the option to purchase or lease their property. An option to purchase is a mutual agreement under which Solar Millennium will purchase or lease your land at an agreed upon price. During the option period Solar Millennium would make monthly payments to you. Once we receive the environmental permits to construct the solar project we could then exercise the right to purchase or lease your property.

SM is committed to providing solar power generation to Southern California, reducing global warming and air pollution through our pollution free electricity.

The future is here and we hope you will be a part of this very exciting project.

We would like to speak with you directly about this. We can be reached at 510-524-4517 or you may call Patrick Jordan or Stewart Smith at 760-325-9091.

E ~~MAIL~~ MAIL - ~~#~~ MLAZARIN @ WINDEMERE.COM

Sincerely,

Jessie

Jessie Audette
Solar Millennium

Solar Millennium LLC
1625 Shattuck Ave.
Suite 270
Berkeley, CA 94709-1611
t. (1) 510.524.4517
f. (1) 510.524.5516
info@SolarMillennium.com
http://www.SolarMillennium.com

May 21, 2009

Mr. Lin Porter
4310 Highway 95 #D
Fort Mohave, AZ 86426

Dear Mr. Porter:

It was a pleasure meeting with you on Wednesday, May 13, 2009. Thank you for taking time out of your day. As we discussed in our meeting, Solar Millennium, LLC ("Solar Millennium") is interested in a purchase option for your 160.54 acre property in Riverside County, California.

We propose a purchase option for a five (5) year option term with an option payment of $5,000 per year. We also would consider an initial three (3) year option term with a renewable two (2) year extension, at our option. During the option term, Solar Millennium would have the right to conduct studies on the property to investigate the viability of a solar installation in the area.

Under a purchase option, if Solar Millennium were to exercise the purchase option, the purchase price would be based on a value of $2,100 per acre.

For your reference, the legal description of the full parcel is: San Bernardino Meridian California, Township 6 South, Range 21 East, Tract 57, all the area described contains 160.54 acres according to the official plat of the said land in the Bureau of Land Management, Patent #1132396, January 21, 1954, Instrument No. 3381.

The APN is: 818-180-001

Thank you for your interest in our offer. We look forward to continuing our discussions, and we will contact you shortly to follow up.

Regards,

Gavin Berg
Senior Project Manager
Solar Millennium, LLC
1625 Shattuck Ave., Suite 270
Berkeley, CA 94709
(510)809-4660

EXHIBIT 311

Comments on the Draft Desert Tortoise Relocation/Translocation Plan for the Palen and Blythe Solar Energy Projects (January 2010).

Comments by: Carlsbad Fish and Wildlife Office (April 15, 2010)

General comments:

1. To ensure that you are referring to the most current guidance and protocols, contact your local USFWS field office or see http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/, where the following can be accessed: Pre-project Survey Protocol (for the 2010 field season); Desert Tortoise Field Manual (December 2009) that includes the 2010 Pre-project Survey Protocol and updated Clearance Survey Guidelines, Handling Guidelines*, and Exclusion Fence Specification; Qualifications and Requirements for Authorized Biologists; and Desert Tortoise Authorized Biologist Request Form (September 2009).

   *Please note that the temperature thresholds outlined in the current Handling Guidelines (December 2009) have been revised (see Step 6 below).

2. Clearance surveys of linear facilities (i.e., transmission lines) and subsequent moving of DT out of harm's way can be conducted in any season (see Step 4 below). Clearance surveys of the perimeter fence can also be conducted in any season. However, any DT found during clearance of the perimeter fence should be moved out of harm's way, fitted with a transmitter, and treated as a translocatee (see Step 4 below). Clearance surveys of the power plant site and subsequent DT translocation should only be conducted during DT active periods (see Step 4 below).

3. In order to monitor the effectiveness of translocation to minimize take of DT, monitoring should include an equal number of translocated, residents, and control DTs (see Step 7 below).

4. The USFWS would like to meet with the Applicant, BLM, and CDFG to identify specific (a) translocation sites for DT found in the power plant area, the central water diversion channel, and along the perimeter fence and (b) control sites necessary for monitoring.

DOCKET
09-AFC-6
DATE APR 29 2010
RECD. APR 29 2010

Comments on the Draft Desert Tortoise Relocation/Translocation Plan for the Palen and Blythe Solar Energy Projects (January 2010).

Comments by: Carlsbad Fish and Wildlife Office (April 15, 2010)

The following is a general procedure that should be detailed in a translocation plan for a large-scale solar project during which fewer than 10 DT are likely to be moved on the day of collection to a translocation site less than 5 km from the point of collection. Please note that if translocation greater than 5 km from the point of collection is necessary, additional steps would be required including, but not limited to, disease testing of all translocated DT and an equivalent number of resident DT at the translocation site.

NOTE: Steps 1 thru 3 may be conducted prior to FWS issuance of a biological opinion.

1. **Estimate the number of DT to be affected by the proposed action** at the project site; provide data on carcasses encountered according to data collected during pre-project surveys. These data will be used to estimate take and assist in identifying potential translocation sites.

2. **Identify potential translocation recipient and control sites** in coordination with Federal and State wildlife and land management agencies, and obtain approval of the landowner/manager for use of the sites. Potential translocation recipient sites should close to or contiguous with the project site (i.e., no barriers to movement) and should have no designated ROWs or other encumbrances, support DT habitat suitable for all life stages, and be managed for conservation so that potential threats from future impacts are precluded in perpetuity. Potential control sites should be equivalent in habitat type/quality DT population size/structure as the project and recipient sites. Control sites should not have been previously used as a recipient site for other projects and should be a minimum distance of 10km from the project site if the site is unfenced or no substantial anthropogenic or natural barrier exists to prevent the interaction of control, resident, and translocated DT.

3. **Confirm presence of DT (live DT or sign) at agreed upon recipient and control sites** using the most recent USFWS pre-project DT survey protocol; include data on carcasses. Incidental observations of clinical signs of disease[1] should be noted during the surveys to estimate general abundance of disease at potential recipient and control sites. If these surveys are conducted prior to FWS issuance of a biological opinion, no handling of DT is authorized.

NOTE: Steps 4 thru 8 may be conducted upon FWS issuance of a biological opinion.

4. **Conduct clearance surveys for linear facilities (i.e., transmission lines) and perimeter fencing during any season. Conduct clearance surveys of the power plant site during DT active periods.** Clearance surveys of the power plant site are complete when no additional DTs are detected after two consecutive surveys.

---

[1] Clinical signs of upper respiratory tract disease: nasal or moderate-to-severe ocular discharge, eroded nares, partially or completely occluded nares. Signs of dried nasal and ocular discharge must be obvious and should not be confused with dried dirt or mud on the beak and nares from recent rain events. Clinical signs of herpesvirus: plaques on the tongue, palate, and other parts of the mouth.

Linear Facilities - DT found during clearance of linear facilities should be moved out of harm's way following clearance and handling procedures outlined in the FWS *Desert Tortoise Field Manual* (December 2009) or more current guidance.

Perimeter Fence - All DT found during clearance surveys of the perimeter fence will be treated as translocatees and moved to the translocation site during the active season. If clearance of the perimeter fence is conducted outside of the DT active season, then any DT found should be moved out of harm's way but to the inside of the perimeter fence (i.e., onto to power plant site), be fitted with a transmitter, blocked into an artificial or empty natural burrow and monitored. Boards used to block the burrow should be placed so that the animal can exit if desired and be removed the last week of February. The blocked burrow should be monitored one time per day during the first week then one time per week for the next three weeks, then two times per month until power plant clearance surveys. If clearance of the perimeter fence is conducted during the DT active season, then follow procedures outlined below for clearance of the power plant site.

Power Plant Site - DT found during clearance of the power plant site (or during clearance of the perimeter fence during the active season) should be given a health assessment[2]. If no clinical signs of disease, these animals should be assigned a unique identifier (provided by USFWS), fitted with a transmitter by qualified personnel approved by the USFWS (via the biological opinion) and State wildlife agencies, moved to the agreed upon translocation site following clearance and handling procedures outlined in the FWS *Desert Tortoise Field Manual* (December 2009) or more current guidance, and monitored following procedures outlined in Step 7 below.

DTs showing clinical signs of disease should be sent to the Desert Tortoise Conservation Center (DTCC) in Las Vegas where they will undergo further assessment, treatment, and/or necropsy; some DT will be rehabilitated and potentially be eligible for subsequent release (advance coordination with the USFWS, State wildlife agencies, and the DTCC is recommended to facilitate prompt transport of DTs). Project proponents will be charged a flat fee of $9,000 for each DT sent to the recovery center commensurate with the cost to provide housing, care, treatment, and other services for 5 years ($3,000 for year 1, $1,500 for years 2-5). No additional funds will be requested from project proponents for DTs remaining at the center after 5 years

Data collected during clearance surveys should include detailed information about the exact site of collection (UTMs from GPS, description of location, etc.) and will be standardized for all projects.

5. **If DT are found during clearance of the perimeter fence or power plant site, then locate an equal number of DT at the agreed upon recipient and control sites and monitor following procedures outlined in Step 7 below.**

[2] A health assessment will include a physical inspection (*i.e.*, notation of clinical signs of acute disease infection, body mass, and carapace measurements). These assessments can only be conducted during the DT active season.

6. **Translocate individual DT on the day of collection under the following conditions:**

- Translocations should occur in spring (approximately April-May), but fall (August-October) may also be considered.
- Releases should occur when temperatures range from 18-30°C (65-85°F) and are not forecasted to exceed 32° (90°F) within 3 hours of release and 35° (95°F) within 1 week of release. Additionally, daily low temperatures should not be cooler than 10° (50°F).
- DTs should be transported to their release sites in clean, ventilated protective containers. If re-used, these containers must be disinfected using 10 percent household bleach or other solution approved by USFWS and the State wildlife agency before being used for another DT.
- Within 12 hours before release, all DTs to be translocated should be hydrated according to existing protocols.
- DTs should be released at unoccupied, shelter sites. Shelters include unoccupied soil burrows, spaces within rock outcrops, caliche caves, and the shade of shrubs.
- Data fields will be standardized and provided to the project proponent by USFWS during the planning process.

7. **Implement post-translocation monitoring (5-yr minimum) and adaptive management.** In order to monitor the effectiveness of translocation to minimize take of DT, monitoring should include an equal number of translocated, residents, and control DTs. For example, if six DT are to be translocated, six resident, and six control DTs should also be monitored at even sex ratios (regardless of whether or not the group of translocatees has an even sex ratio), if possible. In situations where fewer resident DTs exist at the recipient site than translocatees being added (likely in targeted depleted areas), all residents should be monitored. When applicable, prior to the translocation, resident and control DTs should be located monthly at minimum.

<u>Frequency of Monitoring</u>: Monitoring refers to pinpointing the exact location of the DT and attempting to view it without disturbance unless entrapment or a scheduled body condition assessment requires handling.

<u>Translocated DTs (with transmitters) should be monitored as follows</u>:

- Once within 24 hours of release,
- A minimum of twice weekly for the first two weeks, and
- A minimum of once a week during the active season (approximately March through early November) and once every other week from November to February starting after the third week of release.

<u>Resident and control DTs should be monitored as follows</u>:

- A minimum of once a week during the active season (approximately March through early November); and
- A minimum of once every other week from November to February.

Annual assessments of condition (*i.e.*, measurements of body mass and carapace, health assessment, calculation of body condition) should be conducted both prior to and subsequent to over-wintering. Any health problems observed (*e.g.*, rapid declines in body condition, perceived outbreaks of disease, mortality events) should be reported to the USFWS and State wildlife agency such that implementation of approved adaptive management measures occurs in a timely fashion. Mortalities should be investigated as thoroughly as possible. Information on health concerns or mortalities, including DT unique identifier, location, and cause of death (if determined) should be provided to USFWS and State wildlife agency upon discovery (verbally within 48 hours or via email within 5 business days). Fresh carcasses should be submitted for necropsy (details to be provided during project planning and coordination with USFWS) and the cost covered by the proponent.

In addition to monitoring the DTs, we recommend that vegetation transects at representative sampling locations within the site be repeated annually to capture potential changes in habitat characteristics. At a minimum, monitoring of the annual species component is recommended to identify changes in forage availability. The USFWS will provide additional guidance to project proponents on appropriate methods of vegetation monitoring and sampling during the consultation process.

Explicit triggers for implementation of adaptive management will be project specific and developed through coordination with USFWS and State wildlife agencies. Upon conclusion of the 5-year monitoring period, health assessments should be performed on all remaining monitored DTs and transmitters should remain attached until the USFWS and State wildlife agencies have determined whether or not further action is warranted at the site.

8. **Compile and synthesize data throughout duration of translocation**. The DT translocation plan should outline Reporting Requirements including who will be responsible for submitting the information collected under the plan, the type of information that will be submitted, and how often and when the information will be submitted to the appropriate agencies.

EXHIBIT 312

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of: **APPLICATION FOR CERTIFICATION** **for the *BLYTHE SOLAR POWER PROJECT***	**Docket No. 09-AFC-6** **PROOF OF SERVICE** ***(Revised 1/26/2010)***

APPLICANT

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillenium.com

Elizabeth Ingram, Associate Developer, Solar Millennium
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
berg@solarmillennium.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

APPLICANT'S CONSULTANT

Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
carl.lindner@aecom.com

COUNSEL FOR APPLICANT

Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL FOR APPLICANT

Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive Palm Springs, CA 92262
CAPSSolarPalen@blm.gov

California ISO
e-recipient@caiso.com

INTERVENORS

Tanya A. Gulesserian,
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

ENERGY COMMISSION

Karen Douglas
Chairman and Presiding Member
kldougla@energy.state.ca.us

Robert Weisenmiller
Commissioner and Associate Member
rweisenm@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Siting Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Carl Lindner, declare that on, April 22, 2010, I served and filed copies of the attached Blythe Solar Power Project Materials:

Blythe Spring Survey protocol Notification
Technical Area: Biological Resources

The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_blythe].

The document has been sent to 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;

_____ by personal delivery or by overnight delivery service or depositing in the United States mail at Camarillo, California with postage or fees 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, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

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

Carl E. Lindner

ORIGINAL

DOCKET
09-AFC-6
DATE APR 22 2010
RECD. APR 22 2010

April 22, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Spring Survey Protocols
Technical Area: Biological Resources

Dear Mr. Solomon:

Solar Millennium is submitting to the California Energy Commission (CEC) the attached summary of biological resource survey studies and methodologies planned or currently being implemented for 2010 for the Blythe Solar Power Project (Project) in the Colorado Desert area of California. The plant site is located near Blythe, in eastern Riverside County. The purpose of this letter is to inform CEC and relevant resource agencies of our biological survey approach and methodologies for this Project site in 2010.

If you have any questions on this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-4611
tel (1) 510-524-4517
fax (1) 510-524-5516
info@SolarMillennium.com
http://www.SolarMillennium.com

AECOM

AECOM
1420 Kettner Boulevard
Suite 500
San Diego, CA 92101
www.aecom.com

619.233.1454 tel
619.233.0952 fax

April 22, 2010

Mr. Rick York
California Energy Commission
1516 Ninth Street, MS-40
Sacramento, CA 95814-5512

Subject: Biological Survey Methodologies for the Palen Solar Power Project Site, 2010

Dear Mr. York:

On behalf of Solar Millennium, LLC, AECOM is submitting to the California Energy Commission (CEC) the attached summary of biological resource survey studies and methodologies planned or currently being implemented for 2010 for the Palen Solar Power Project (Project) in the Colorado Desert area of California. The plant site is located near Desert Center, in eastern Riverside County. The purpose of this letter is to inform CEC and relevant resource agencies of our biological survey approach and methodologies for this Project site in 2010.

As a result of Project modifications and the development of Project alternatives (as required by the Bureau of Land Management [BLM] environmental review process) that occurred after surveys were completed in 2009, the AECOM Team is undertaking additional technical surveys and studies in 2010. These additional surveys are necessary to satisfy Data Requests issued by the CEC during the Applications for Certification (AFC) process and to support related environmental documentation for this Project, as required for Project approval. Survey results will also be used to update environmental baseline information to support permit applications to other federal, state, and local agencies. In particular the survey results will be used to update and fully characterize the existing biological resource conditions on the project site (including alternatives) as requested by the CEC in its Data Requests, to support determinations regarding Project (or alternative) impacts, to further formulate mitigation requirements, and to provide specific data needs of reviewing agencies.

Key to providing Project updates in support of necessary Project approvals and permits described above is the collection of data concerning the occurrence and distribution of biological resources within previously unsurveyed portions of the Project site (including alternatives) and associated buffers. The biological surveys and data collection planned and currently being implemented for 2010 take into account the physical characteristics of areas to be surveyed, the life histories of the target species, and the guidelines and protocols promulgated by the resource agencies.

Consistent with what was requested by the agencies in 2009, the AECOM Team is providing a written summary of the 2010 survey approach and methodologies, together with a detailed map of areas planned for survey at the Project site. Maps of planned survey areas for each biological resource at the Project site are enclosed. Please note that the maps showing planned survey areas are consistent with current Project (and alternative) design and may change with further refinement of the Project or alternative. In the event that the Project site or alternative are further modified after submittal of this letter, survey areas may be adjusted accordingly to meet the same purpose and intent of documenting and evaluating the environmental baseline for biological resources on the Project site. Biological surveys have already been initiated at the Project site (see attached document.

In submitting this information, it is our hope to keep CEC, and the other resource management agencies (BLM, CDFG, and USFWS) that have been involved in the review and approval of this Project, apprised of our efforts related to biological resource surveys on this Project site. It is Solar Millennium's desire to ensure that the surveys conducted at the Project reflect the most current CEC

and resource agency guidance and that the methodologies being implemented are communicated to CEC and resource agencies early in the survey season.

Please call Bill Graham at (619) 233-1454 if you have any questions.

Sincerely,

William Graham
Principal
Bill.Graham@aecom.com

Enclosures:
Palen Solar Power Project Proposed 2010 Survey Protocols
Figures P-1 through P-4. Palen Solar Power Project Preliminary Survey Maps 2010

cc: Janet Eubanks, BLM
Holly Roberts, BLM
Mark Massar, BLM
Shelly Ellis, BLM
Larry LaPre, BLM
Magdalena Rodriguez, CDFG
David Hacker, CDFG
Pete Sorenson, USFWS
Tannika Engelhard, USFWS
Danielle Dillard, USFWS
Carl Benz, USFWS

SURVEY APPROACH AND METHODOLOGIES FOR THE SOLAR MILLENNIUM PARABOLIC TROUGH PALEN SOLAR POWER PROJECT

2010

Prepared by:

AECOM
1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone: (619) 233-1454
Fax: (619) 233-0952

April 2010

TABLE OF CONTENTS

Section **Page**

Biological Resource Survey Approach 1

Biological Resource Survey Protocols 1

Desert Tortoise Protocol 2

Presence-or-Absence Surveys 2

Buffer Transect Sign Surveys 3

Western Burrowing Owl Protocol 3

Phase I Survey: Habitat Assessment 3

Phase II Survey: Burrow Mapping 4

Phase III Survey: Burrowing Owl Surveys, Census, and Mapping 4

Botanical Surveys 4

Vegetation Community Mapping 5

Rare Plant Surveys 6

Additional Survey Considerations 9

Jurisdictional Waters Delineation 10

Formal Delineations for Potential Jurisdictional Waters of the United States 10

Formal Delineations for Potential Jurisdictional Waters of the State 11

Functions and Values Assessments 11

Golden Eagle Surveys 13

General Biological Survey Details 13

References 15

Attachment 1 - Figures

Figure P1 - Palen Solar Power Project DT Survey Areas - Spring 2010

Figure P2 - Palen Solar Power Project WBO Survey Areas - Spring 2010

Figure P3 - Palen Solar Power Project Vegetation Mapping and Rare Plant Surveys - Spring 2010

Figure P4 - Palen Solar Power Project Jurisdictional Waters Survey Areas - Spring 2010

Attachment 2 - Target List of Special Status Plant Species for 2010 Surveys

Survey Approach and Methodologies for the Solar Millennium Parabolic Trough Palen Solar Power Project 2010

Biological Resource Survey Approach

After submittal of the Application for Certification (AFC) documents to the California Energy Commission (CEC) in 2009, an alternative site configuration was proposed for the Palen Solar Power Project (PSPP). Additionally, various Project design refinements were made related to potential transmission line routes and the substation area.

Additional biological surveys are needed in 2010 to gather data concerning an alternative site configuration and changes in linears in support of Project review, approval, and permitting. The following biological resource surveys will be conducted at the Project site during 2010: desert tortoise (*Gopherus agassizii;* DT) survey, burrowing owl (*Athene cunicularia*; WBO) survey, botanical survey (vegetation community mapping and rare plant surveys), golden eagle (*Aquila chrysaetos*; GOEA) survey, and jurisdictional waters delineation.

All protocols to be implemented in 2010, and described herein, are consistent with 2009 survey protocols, with the exception of a few modifications to the DT protocol, rare plant surveys, and jurisdictional waters surveys. DT protocol surveys for 2010 were initiated earlier than in 2009, and earlier than specified in established protocols (with U.S. Fish and Wildlife Service concurrence; see "Desert Tortoise Protocol" below). Botanical surveys in 2010 will address additional special-status plant species not previously included in 2009 surveys (see "Botanical Surveys" below). The jurisdictional waters delineation in 2010 will also include surveys of a 250-foot buffer of Project and Alternative disturbance areas not included in the 2009 surveys (see "Jurisdictional Waters Delineation" below).

Some survey protocols have already been initiated in 2010 at the Project site. DT surveys were initiated on March 16, 2010. Botanical surveys were initiated on March 8, 2010. GOEA surveys have also been initiated. Jurisdictional waters delineation surveys have been completed. WBO surveys have not yet been initiated at the PSPP site but are anticipated to begin during the week of April 26, 2010.

In general, surveys at the Project site will occur within 1) proposed Project disturbance areas (based on footprint refinements) and, 2) Project disturbance area buffer zones that were not previously surveyed in 2009. At the PSPP site, surveys will additionally occur within 3) proposed Project Alternative site disturbance areas (or Alternative disturbance areas) and 4) Alternative disturbance area buffer zones that were not previously surveyed in 2009.

A detailed description of the survey locations and methods for each biological resource survey being implemented in 2010 is provided below.

Biological Resource Survey Protocols

This section identifies the specific locations in which biological resource surveys have already been completed (e.g.., survey extent [2009]) and will be conducted in 2010 (e.g., survey areas [spring 2010] and buffer survey areas [spring 2010]) at the Project site (Figures P-1 through P-4; see Attachment 1 for all figures), and describes the detailed survey methodologies (i.e., protocols) that will be implemented in 2010. If Project or Alternative disturbance areas are further modified after the date listed on this

document, survey areas and protocols may be modified accordingly to meet the purpose and intent of documenting and evaluating the environmental baseline for biological resources on the Project site.

Desert Tortoise Protocol

DT surveys will include a combination of Presence-or-Absence surveys (i.e., 100 percent coverage surveys), and additional transect-based sign surveys within a Project buffer zone. DT Presence-or-Absence surveys will occur in suitable habitat within proposed Project disturbance areas and Alternative disturbance areas for which surveys were not previously conducted in 2009 (Figure P-1). Sign surveys will occur along CEC-required buffer transects (placed at 1,000-foot, 0.75-mile, and 1-mile intervals from disturbance areas) that were not previously surveyed in 2009 (Figure P-1); see below for more complete description of CEC-required buffer transects. A habitat assessment for DT has already been completed at the Project site in February 2010 and areas to be surveyed in 2010 were determined to be potentially suitable for DT.

Presence-or-Absence Surveys

Presence-or-Absence surveys (100 percent coverage surveys) for DT during 2010 will follow the guidelines published in the 1992 U.S. Fish and Wildlife Service (USFWS) survey protocol (USFWS 1992), with the following exception: no surveys of the five zone of influence (ZOI) transects that are typically required outside of and parallel to the disturbance area at 100, 300, 600, 1,200, and 2,400 feet will be conducted. Use of the USFWS 1992 protocol with the exception of ZOI transects (as occurred in 2009), rather than the revised 2009 protocol (USFWS 2009), was agreed upon by USFWS, California Department of Fish and Game (CDFG), U.S. Bureau of Land Management (BLM), and CEC in 2009 prior to survey initiation per an email communication dated March 10, 2009, from Julie Vance (refer to Section 2.2.1 of the AFC).

In accordance with the 1992 USFWS protocol, previously unsurveyed portions of the Project disturbance area at the Project site will be surveyed using transects spaced approximately 30 feet apart along transects oriented north to south or along transects that are parallel to the edges of the disturbance areas. The survey will be conducted by slowly and systematically walking linear transects while surveyors visually search for DT and sign. Particular emphasis will be placed on searching around the bases of shrubs and along the banks of shallow washes. All types of DT sign (live tortoises, shells, bones, scutes, limbs, scat, burrows, pallets, tracks, egg shell fragments, drinking sites etc.) will be recorded using a Global Positioning System (GPS) unit. If vegetation or topography reduces the surveyor's ability to see DT sign, the spacing between survey transects will be reduced, as necessary. This would occur in areas with high vegetation density or where topography obscures the surveyor's ability to see DT sign.

Any DTs observed will be measured at middle carapace length (MCL) and evaluated for health. Photographs of DT observations will be taken when possible (e.g., animal not deep in burrow). Photographs of large carcasses and/or unusual sign will also be taken. Burrows, scat, and shell remains will be classified using the Information Index for Desert Tortoise Sign: Burrows and Dens, Scats and Shell Remains as in the USFWS protocol (USFWS 1992).

DT Presence-or-Absence surveys were initiated on March 16, 2010 (with wildlife agency approval; see discussion below) at the PSPP site; at this time mean daily temperatures had reached a minimum of approximately 65°F, adequate annual forage was available for DTs, and evidence of DT activity was observed at the nearby Blythe Solar Power Project site. The proposal to initiate Presence-or-Absence surveys at the PSPP site earlier than the March 25 to May 31 survey period, as stated in the UFSWS 1992 protocol, or the April through May survey period as stated in the USFWS 2009 protocol (USFWS 2009), was presented in a letter to Pete Sorenson at the USFWS (dated March 2, 2010, attached) with subsequent USFWS concurrence via email from Pete Sorenson on March 16, 2010. DT surveys will continue roughly until the end of April or until the survey effort is completed (prior to May 31).

After completion of Presence-or-Absence surveys, results will be used to calculate estimated adult DT (> 160-mm MCL) abundance within disturbance areas surveyed in 2010. Abundance estimates will be calculated according to the 2009 survey protocol (*Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise* (*Gopherus agassizii*) [USFWS 2009]) if protocol assumptions are met (e.g., minimum of 20 DTs are detected within the survey area).

Buffer Transect Sign Surveys

To comply with the recommendations of the draft CEC *Recommended Biological Resources Field Survey Guidelines for Large Solar Projects* (CEC 2007a), transects outside of and parallel to proposed Project disturbance areas will also be surveyed for DT and their sign (Figure P-1). These CEC-required buffer transects will be placed at 3,960 feet (0.75 mile) and 5,280 feet (1 mile) from and parallel to the edge of nonlinear portions of disturbance areas as well as at 1,000 feet from the edge of linear portions of disturbance areas (e.g., transmission line). Surveys along buffer transects will be conducted in a similar fashion as for transects described for Presence-or-Absence surveys, by slowly and systematically walking linear transects while surveyors visually search for DT, their sign, or other special-status species and their sign. Particular emphasis will be placed on searching around the bases of shrubs and along the banks of shallow washes. These transects are more broadly focused than the DT Presence-or-Absence protocol transects, described above, and are not a part of the 1992 USFWS DT protocol requirements. However, they provide additional information on DT occurrence and habitat suitability as well as other biological resources in the area surrounding Project or Alternative disturbance areas.

Western Burrowing Owl Protocol

WBO surveys will focus on suitable habitat in proposed Project disturbance areas Alternative disturbance areas, and surrounding buffer zones that were not surveyed in 2009 (Figure P-2). Surveys will follow the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by The California Burrowing Owl Consortium (CBOC) (1993). In accordance with the protocol, a habitat assessment (Phase I survey) for WBO will be conducted in previously unsurveyed portions of the Project and Alternative disturbance areas and in the surrounding 150-meter (approximately 492-foot) buffer zone. Following the Phase I survey, a focused burrow survey (Phase II survey) and WBO survey (Phase III survey) will be conducted in suitable habitat within proposed disturbance areas and the surrounding 492-foot buffer zone. Also, a more general survey of habitat suitability and occurrence of WBO, other special-status species, and sign will be conducted within a 1-mile CEC buffer surrounding disturbance areas (according to the CEC's Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects [CEC 2007a]), if accessible to the biologists conducting the surveys (see "General Biological Survey Details," below).

The following describes, in more detail, the WBO survey approach and methodology that will be followed in 2010, and is consistent with surveys conducted in 2009.

Phase I Survey: Habitat Assessment

A habitat assessment (Phase I survey) for WBO will be conducted by qualified biologists in early spring 2010. The unsurveyed portions of proposed Project and Alternative disturbance areas and the surrounding 150-meter (approximately 492-foot) buffer zone will be evaluated for suitability for WBO, as well as unsurveyed areas within a 1-mile buffer of proposed disturbance areas. Suitable habitat for WBO includes open habitat with available burrowing opportunities, including agricultural fields (active and fallow), Mojave creosote scrub, desert saltbush, ephemeral washes, and ruderal areas. Suitable habitat will be mapped in the field using high-resolution field maps and GPS units. Any WBOs or WBO sign (e.g., whitewash, pellets, feathers) observed during the Phase I survey will be recorded and mapped.

Phase II Survey: Burrow Mapping

The Phase II burrow survey will be initiated in early spring and will mostly be conducted concurrently with focused Presence-or-Absence DT surveys. The Phase II burrow survey will occur in suitable WBO habitat within previously unsurveyed portions of proposed Project and Alternative disturbance areas, as well as within the 492-foot buffer zone, as required by the CBOC protocol. Where the Phase II burrow survey is conducted concurrently with Presence-or-Absence DT surveys, it will be conducted along pedestrian transects spaced at a maximum of 10 meters (approximately 30 feet) apart; otherwise, spacing between transects may extend up to 30 meters (approximately 100 feet), in accordance with the CBOC protocol. Biologists conducting the Phase II survey will record and map potentially suitable burrows (based on burrow dimensions and characteristics); they will also record and map WBO observations, presence and types of WBO sign (e.g., whitewash, pellets, feathers) observed, and active or potentially active WBO burrows (based on the presence and quality of sign at suitable burrows). These features will be recorded electronically using GPS units and on data forms; WBO observations and potentially active burrows will also be mapped on field maps. Phase II burrow data will also include the type of burrow, if known (e.g., kit fox [*Vulpes macrotis*]; DT), and a GPS identity code.

Phase III Survey: Burrowing Owl Surveys, Census, and Mapping

Phase III surveys will be initiated and completed during the peak breeding season (April 15 through July 15, as defined in the CBOC protocol) and will continue until all burrows with WBO sign have been visited on four separate days. Phase III surveys are intended to determine owl presence on the site and how the site is being used by WBO. It is anticipated that surveys will be completed by the end of May 2010. During the first survey visit of Phase III, previously mapped (during Phase II) suitable burrows will be surveyed by biologists carefully approaching on foot to determine the presence of WBOs and/or WBO sign, in order to assess potential burrow status. Subsequent survey visits (i.e., visits 2–4) will focus on burrows with WBO sign. Based on 2009 survey results, the Project sites are known to include several burrows with WBO sign that is old and degraded, sparse, and absent of any indication of current or recent use. Although all burrows with confirmed WBO sign (including those with old, degraded or sparse sign) will be surveyed four times, only burrows with sign of current or recent occupancy by WBOs will be identified as "potentially active" for purposes of this survey. For any potentially active WBO burrows (i.e., burrows with sign of current or recent occupancy by WBO) identified during visit 1, the burrow areas will be observed during subsequent visits (i.e., visits 2–4) using binoculars or a spotting scope, using the vehicle as a blind (if possible); all other burrows with sign will be approached on foot. It is important to minimize disturbance near active/occupied burrows; if WBOs are detected in association with a burrow, attempts will be made to determine the burrow status without approaching the burrow too closely on foot.

Phase III surveys will be conducted between 1 hour before and 2 hours after sunrise, and between 2 hours before and 1 hour after sunset. Phase III surveys will not be conducted during inclement weather (e.g., wind speeds > 20 miles per hour, heavy rain or fog, etc.). Field data recorded during each survey visit will include date; survey number; weather conditions (temperature, wind, precipitation, cloud cover); surveyor name; start and stop times for each survey visit; location of burrows surveyed during each visit; the suitability of each burrow, based on burrow dimensions and characteristics (collected during first visit to the burrow); presence, absence, and type of WBO sign (if present) at each burrow; occupancy status (active, potentially active, inactive, based on presence and condition of sign); documentation of any WBO detections, including abundance, age, sex, and behavior; and other wildlife species observed. Photographs will be taken of all potentially active burrow locations. In addition, photographs of individual WBOs and active burrows would be taken, if possible without disturbing owls. Any special-status species or their sign observed during these surveys will be recorded electronically using GPS and on data forms.

Botanical Surveys

Botanical surveys in 2010 will include vegetation community mapping (to be conducted during spring) and rare plant surveys (to be conducted during spring and fall, depending on the timing and amount of 2010

precipitation). Vegetation community mapping will occur within proposed Project disturbance areas, Alternative disturbance areas , and within associated one-mile CEC buffers that either were not previously surveyed or need to be resurveyed using a smaller minimum mapping unit (MMU) (refer to "survey areas (Spring 2010)" and buffer survey areas (Spring 2010)" on Figure P-3). Rare plant surveys will occur within the Project (or Alternative) disturbance areas and associated 1-mile CEC buffer areas that were not previously surveyed in 2009 (refer to "survey areas (Spring 2010)" and buffer survey areas (Spring 2010)" on Figure P-3).

Additionally, rare plant surveys at the PSPP site will also occur within proposed disturbance areas (Project or Alternative) and associated one-mile CEC buffer areas (Figure P-3) that were previously surveyed in 2009 (i.e., refer to "survey extent (2009)" on Figure P-3), to the extent necessary, to comply with the December 2009 CEC data request for consideration of 15 additional special-status plant species and detailed mapping of ribbed cryptantha (*Cryptantha costata*).

Botanical surveys were initiated on the PSPP site on March 8, 2010.

Vegetation Community Mapping

Vegetation community mapping during spring 2010 will be conducted in accordance with the same methods as 2009 mapping efforts, with minor updates based on 2009 field experience. These updates include the following topics:

- Scale of field maps: Field maps used for vegetation mapping will have a scale of 1 inch = 700 feet. Maps at a 200-foot scale (used in 2009) were determined to exceed the resolution of the aerial imagery available and were found to be too cumbersome given the large size of the Project sites being surveyed.
- Clarification of mapping intensity: Similar to 2009, survey intensity in 2010 will vary according to the MMU of disturbance areas versus the 1-mile CEC buffers; areas with smaller MMUs (disturbance areas) will be surveyed with greater intensity than areas with larger MMUs (1-mile CEC buffer areas). To accomplish this, field biologists will walk transects at a spacing that allows visual coverage of all unique vegetation signatures having an area equal to or greater than the defined MMU size.

A detailed methodology for 2010 vegetation community mapping is provided below.

Field biologists will use orthotopographic maps at a scale of 1 inch equals 700 feet for both vegetation mapping and recording rare plant points or polygons (see "Rare Plant Surveys" below). If rare plants are documented during vegetation mapping, these sites will be noted and revisited during focused rare plant surveys in order to map plants in more detail and accurately delineate species populations using GPS equipment. Vegetation communities will be classified according to Holland (1986). Sawyer and Keeler-Wolf (1995) and CDFG (2003) classifications will be used to provide additional detail where appropriate, such as denoting special or sensitive vegetation communities that are either known or believed to be of high priority for inventory in the California Natural Diversity Database (CNDDB) due to their unique nature, limited distribution (i.e., rarity), or importance for special status wildlife species.

Vegetation mapping within proposed Project (or Alternative) disturbance areas may be conducted concurrently with rare plant surveys, by having surveyors walk meandering transects; transect spacing will be based on habitat complexity and topography, and will be close enough to allow visual coverage of vegetation signatures at the minimum mapping unit (0.01 acre for riparian areas and 1.0 acre for all other cover types within proposed disturbance areas [Project or Alternative]). Within the buffer, the MMU for all land cover types, including riparian, will be 1.0 acre. Vegetation mapping within the 1-mile CEC Project (or Alternative) buffer areas will therefore be conducted by walking transects within native habitat that are spaced wider than those walked within disturbance areas, but allow visual coverage of vegetation

signatures that are 1.0 acre in size or larger. Developed land and agricultural areas will be surveyed by a combination of walking transects and selecting key vantage points from existing dirt access roads.

Dominant plant species present within each riparian and upland vegetation community mapped on site will be recorded according to the 50/20 dominance rule (U.S. Army Corps of Engineers [USACE] 1987). According to this rule, dominant plant species are defined as those that, when ranked in order of abundance, collectively make up 50 percent relative cover. Each dominant species individually makes up at least 20 percent relative cover, or is needed to surpass the 50 percent relative cover threshold. Once the dominant plant species are identified according to this method, they will be grouped according to relative cover: species below 20 percent, species ranging from 20 to 50 percent cover, and species exceeding 50 percent cover.

Additionally, a description of each vegetation community mapped on site will be recorded including the extent of disturbance, presence of special soils, potential jurisdictional waters, and habitat suitability for rare plant species (see "Rare Plant Surveys", below). Invasive species listed by the California Invasive Plant Council (Cal-IPC) as A-1, A-2, and B status species (Cal-IPC 2009) will be noted when occurring in high concentrations (approximately 108 square feet and larger) and in nearly monotypic stands. Potential invasive plant species that may be encountered during 2010 surveys on the Project site include tamarisk (*Tamarix* spp.), Saharan mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* sp.), red brome (*Bromus madritensis*), and cheat grass (*Bromus tectorum*).

Rare Plant Surveys

Rare plant surveys during spring 2010 will be conducted in accordance with the same methods as 2009 surveys, with updates based on 2009 field experience and CEC guidance. These updates include the following:

- Survey intensity: Detailed descriptions are now provided to explain the differences between survey intensity within the disturbance area versus that in the 1-mile CEC buffer, especially with respect to habitat suitability.
- Habitat suitability: methods for determining habitat suitability have been enhanced at the request of CEC.
- Complete tracklog: each biologist will have a GPS unit recording their path during surveys, and these data will be compiled and submitted with the deliverable.
- Search image: biologists will visit reference sites and/or herbaria specimens to obtain a search image for each targeted California Native Plant Society (CNPS) List 1B or List 2 plant species during the reconnaissance phase of surveys.
- Coachella Valley milkvetch (*Astragalus lentiginosus* var. *coachellae*) focused surveys: if suitable habitat is defined within the disturbance areas and surrounding 1-mile CEC buffers, these areas will be intensively surveyed according to the Coachella Valley milkvetch survey plan (described below). The need for focused Coachella Valley milkvetch surveys is unlikely based on research to date (see below). The survey plan has been created as a precaution.
- Deliverable enhancements: the botanical survey report will include all raw field data as attachments and will contain discussion of special status plant species occurrences with respect to onsite conditions as well as known species ranges and suitable habitats.
- Fall surveys: while late-season surveys were not feasible in 2009 due to limited rainfall, 2010 may have adequate late-summer rainfall to warrant fall surveys and additional consideration has been given to four fall-blooming special status plant species.

A detailed methodology for 2010 rare plant surveys is provided below, which includes 2009 methods as well as the updates noted above.

Rare plant surveys will follow survey guidelines from the following resources: 1) Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants (USFWS 2000); 2) Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFG 2009)[1]; 3) CNPS Botanical Survey Guidelines (CNPS 2001); and 4) Survey Protocols for Survey and Manage Strategy 2: Vascular Plants (Whiteaker et. al. 1998).

Target species for rare plant surveys will include special-status plant species that meet at least one of the following criteria:

- Covered under the Federal or California Endangered Species Act (ESA and CESA, respectively) (CDFG 2009)
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code Section 1900 et seq.)
- BLM sensitive species (BLM Sensitive) (BLM 2009)
- CNPS List: 1A (presumed extinct in California), 1B (rare, threatened, and endangered in California and elsewhere), or 2 (rare, threatened, or endangered in California, but more common elsewhere) species are considered special status plant species if they meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2050 through 2098 (CESA) (CNPS 2009)
- CNPS List: 3 (plants about which we need more information a review list), or 4 (plants of limited distribution–a watch list was also recorded here) (CNPS 2009)
- Locally significant species, covered under the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) (BLM 2002) or the West Mojave Plan (WEMO) (BLM 2005)

At the direction of BLM, cottontop cactus (*Echinocactus polycephalus*), hedgehog cactus (*Echinocereus* spp.), and all varieties of California barrel cactus (*Ferocactus cylindraceus*) encountered on site will also be recorded and mapped during rare plant surveys (LaPre 2009). The CEC has identified 15 additional target species above and beyond those considered in 2009 to be specifically targeted during 2010 rare plant surveys, 11 of which have potential to occur on the Project site (see Attachment 2). Attachment 2 contains the complete list of plant species that will be targeted during 2010 rare plant surveys.

Rare plant surveys will be "intuitive controlled" (per Whiteaker et al. 1998). The surveys will be conducted by walking transects placed systematically throughout disturbance areas (Project and Alternative) and associated 1-mile CEC buffers while searching for target plant species and suitable habitats. In disturbance areas not previously surveyed during 2009, botanists will traverse all representative habitats, providing complete visual coverage in areas determined to be suitable for target plant species (including microhabitats) (see Attachment 2 for target plant list). This will include closely spaced transects in the desert washes, incised channels, and sandy dune habitats (50-100 feet, possibly less depending on topographic complexity) and wider spacing in the flat creosote bush scrub and desert pavement (approximately 100-200 feet, or more depending on visibility). Transects will follow topographic relief rather than predefined survey grids, for the purpose of providing focused coverage of the desert washes.

1. This document replaced the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

Resurveys will occur as many times as necessary to ensure the blooming periods of all target rare plant species have been covered.[2] Additionally, disturbance areas that were previously surveyed in 2009 would be revisited systematically, as deemed appropriate based on field conditions, in order to comply with the December 2009 CEC data request for consideration of 15 additional special-status plant species and detailed mapping of ribbed cryptantha (*Cryptantha costata*).

In the 1-mile CEC buffer areas, suitable habitats associated with the major desert washes or sandy dune habitats will also be surveyed with complete visual coverage but the areas may not be resurveyed with the same rigor as the disturbance area and isolated microhabitats (areas much less than 1 acre in size and not associated with the desert washes or larger dune complexes) may not be examined with complete visual coverage at the discretion of the lead field botanist.

Suitable habitats will be determined based on geography, slope aspect, soil substrate, vegetation community, associated plant species, and familiarity with each species based on reference populations and historical surveys conducted in the region. Unsuitable habitats may be traversed while traveling between areas of suitable habitat, providing partial survey coverage in these areas. Each field botanist will carry a GPS to record their path through the Project site(s) each day.

The exception to the "intuitive controlled" method described above is with respect to the Coachella Valley milkvetch surveys. This federally endangered plant species must receive more focused attention in areas of suitable habitat where the species has potential to occur. Andrew Sanders has determined that Coachella Valley milkvetch is not currently documented outside of the Coachella Valley area. To reach this conclusion, Mr. Sanders thoroughly reviewed the vouchered collections (identified as Coachella Valley milkvetch) from the Desert Center area (Dice 980324-2; Dice 980324-3; and Sears 1173) and other collection data (e.g., http://ucjeps.berkeley.edu/consortium/ and University of California at Riverside (UCR) herbaria specimens). After careful consideration, Mr. Sanders found the Desert Center collections (i.e., all Coachella Valley milkvetch collections outside the Coachella Valley) to be *Astragalus lentiginosus* var. *variabilis* rather than *A. lentiginosus* var. *coachellae*.

Therefore, focused surveys for Coachella Valley milkvetch will not be necessary at the PSPP site unless the species is observed on site or Andrew Sanders encounters additional information leading to a reversal of his findings. Prior to the end of the survey window for Coachella Valley milkvetch (late May), a letter from Andrew Sanders will be provided to USFWS, CDFG, CEC, and BLM to finalize and defend the treatment of Coachella Valley milkvetch during 2010 rare plant surveys.

In the event that focused surveys for Coachella Valley milkvetch do occur, a survey plan has been prepared and is located below (see "Supplemental Survey Methods for Coachella Valley Milkvetch (if Necessary)", below).

The timing of rare plant surveys will be based on the most phenologically appropriate time for each target plant species; surveys will occur when reproductive structures (i.e., flowers and fruits) and distinctive leafy parts are present and easily identifiable. When possible, known locations of rare plants in the vicinity of the Project site will be visited to verify the status of these species during the 2010 growing season

2. In DR-BIO-81 of the AECOM Response to the CEC Data Request (December 2009), it was suggested that biologists should walk 10-20 meter parallel transects within all habitats of the disturbance areas, regardless of habitat suitability. This approach has been revised, since habitat complexity will dictate how far each botanist will be able to see and will therefore dictate the necessary spacing. AECOM botanists have consulted with regional experts including Andy Sanders and David Silverman to conclude that intuitive controlled surveys per Whiteaker et al. 1998 are sufficient for documenting a complete floral inventory on site (including the target special status plant species).

(germinating, flowering, seeding, etc.). If reference site visits are not possible, specimens from the UCR Herbarium will be studied to inform field biologists of important keying characters.

In general, the ideal survey window for 2010 will be closely associated with the rainfall pattern, considering both rainfall totals and the timing of precipitation. Several survey visits may be necessary to accommodate the distinct phenologies of each target rare plant species with potential to occur on the Project site, including surveys during both spring and fall (if rainfall is sufficient for fall-blooming species). It is anticipated that approximately 2-5 survey visits may be necessary to complete rare plant surveys.

During rare plant surveys (spring or fall) each field botanist will record a complete floral inventory, including the phenology(ies) observed (to document the blooming period and calibrate the timing of additional surveys). Plant nomenclature will follow that of *The Jepson Desert Manual* (Baldwin et. al. 2002). Additionally, scientific names will be used in all records to avoid confusion between taxa. Time will be allotted as necessary to confirm the identity of unknown species to the taxonomic level necessary to determine whether it is a target rare plant species or not (e.g., genus, species, or subspecies/variety).

If a target rare plant population is located, the population will be assessed for vigor and possible threats (e.g., off-road vehicle activity and invasive plants) and the number of individuals will be counted (or subsampled and population size estimated in the event of large populations). All sensitive plant locations identified will be recorded directly with submeter handheld GPS units and will be subsequently mapped on aerial photo-based field maps (700-foot scale orthotopographic maps). Rare plant detections will be mapped either as individual point locations (for single plants) or as occupied polygons (for groups of plants). The threshold distance for distinguishing point locations from polygons will be 7 meters; for example, plants occurring within 7 meters of each other will be included in a polygon, and plants beyond the 7-meter threshold will be documented using individual points).

In addition to mapping special status species occurrences, suitable habitat for the target species will be assessed and mapped. In many cases, not enough information is known about microhabitat preferences of a species to define its habitat beyond the level of vegetation communities.

CNDDB forms will be completed and submitted to CDFG (as publically available data) for all special-status plant species observed. Voucher specimens of special-status plant species will be collected if it is determined that such collection would not jeopardize the existing population. These collections will be submitted to the UCR herbarium.

Additional Survey Considerations

During vegetation mapping and rare plant surveys, field botanists will document any creosote bush rings observed if they are readily distinguishable.

Regional experts will be consulted for guidance through all phases of survey work for concurrence with the methods employed by AECOM survey teams. This includes botanists such as David Silverman (of Xeric Specialties Consulting) and Andrew Sanders (of the UCR Herbarium). These experts will receive copies of this methodology for approval, and once in the field they will train crews on species identification, conduct expert habitat assessments, and provide guidance on optimal survey timing for the targeted special status plant species.

Supplemental Survey Methods for Coachella Valley Milkvetch (if Necessary)

All surveys for rare plants will be conducted in compliance with the standardized guidelines issued by the regulatory agencies (USFWS 2000, CDFG 2000, and the CNPS 2001). The species specific methods presented below are intended to be a supplement to the standardized guidelines.

Surveys for Coachella Valley milkvetch will be conducted from approximately February through May 2010, depending upon climactic conditions. The number of surveys required will depend upon the phenology of the populations at the reference sites. It is presumed that two to three separate surveys will be required. Prior to initiating surveys, vouchered specimens deposited at the UCR herbarium will be studied to insure survey personnel are familiar with the species. Visits to one or more known locations of Coachella Valley milkvetch will be conducted to determine current phenology and detectability.

Systematic surveys will be conducted to detect presence and determine distribution of Coachella Valley milkvetch within the survey area. The survey area will only include areas of suitable Coachella Valley milkvetch habitat along the substation and transmission line disturbance area and buffer area. For systematic surveys, biologists will walk parallel transects 5 to 10 meters apart throughout the entire survey area. The survey transects will be recorded with a GPS track log using a submeter handheld GPS. Survey crews will include at least one member who has seen Coachella Valley milkvetch in its natural habitat. Other survey members will be trained using photographs and/or herbarium specimens.

If Coachella Valley milkvetch is detected within the survey area results will be recorded as described below. One herbarium specimen will be deposited at the UCR herbarium, if it is determined that collection will not jeopardize the existing population.

Jurisdictional Waters Delineation

A formal delineation for potential jurisdictional waters of the United States and of the State was completed in April 2010 at the Project site within portions of the disturbance area (Project and Alternative), and within a 250-foot buffer of these areas, for which surveys were not previously conducted in 2009 (Figure P-4). Additionally a qualitative functions and values assessment for ambient conditions and projected post-project conditions of these areas was also completed.

Formal Delineations for Potential Jurisdictional Waters of the United States

Jurisdictional waters of the United States are defined in 33 CFR. 328.3 (Definitions). Previously unsurveyed portions of the proposed Project disturbance area and Alternative disturbance area at the Project site have the potential for the presence of, at a minimum, two types of federally regulated waters, warranting the following:

1. Formal delineations for waters of the United States in the form of wetlands based on the three-parameter method.[3] The three-parameter method for identifying and delineating wetlands is outlined in and in accordance with Federal guidance and procedure following the *Corps of Engineers Wetlands Delineation* (Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (2008 Supplement) (Environmental Laboratory 2008).[4]

2. Formal delineations for other waters of the United States to define and identify the jurisdictional lateral extent of nonwetland waters using field indicators of ordinary high water mark (OHWM) as defined by 33 CFR 238.3(e), Federal guidance and procedure outlined in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (USACE 2008), and *Distribution of Ordinary High Water Mark*

3. The three-parameter method is the simultaneous presence (co-occurrence) of wetland hydrology, hydric soil, and hydrophytic vegetation.

4. The Manual and 2008 Supplement are guidance documents for delineating jurisdictional waters in the form of wetlands only.

(OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" (Lichvar et al. 2006).

3. Other relevant Federal guidance and procedural documents (e.g., Regulatory Guidance Letter, Special Public Notices, and USACE Los Angeles District specific guidance)

Formal Delineations for Potential Jurisdictional Waters of the State

The California Code of Regulations (Title 14 CCR 1.72) defines a stream as: "...a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation." Under Section 1600 *et seq.* of the California Fish and Game Code (CFGC), CDFG regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFG jurisdiction are defined in CFGC Section 1600 *et seq.* as the "bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit." However, in practice, CDFG usually extends its jurisdictional limit and assertion to the top of a bank of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider.

CFGC Section 1602(a) is based on Title 14 CCR 720: "For the purpose of implementing Sections 1601 and 1603 of the Fish and Game Code which requires submission to the department of general plans sufficient to indicate the nature of a project for construction by or on behalf of any person, governmental agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed of any river, stream or lake designated by the department, or will use material from the streambeds designated by the department, all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams and streambeds which may have intermittent flows of water, are hereby designated for such purpose".

Boundaries for xeric riparian waters of the State will be determined (and recorded) by the presence of shelving and/or scour resulting in an established bank, bed, and channel of an ephemeral wash feature and its associated riparian areas (where applicable). In specific areas within the ephemeral wash channels, where evidence of shelving or scour is absent, subsurface investigations will be undertaken to identify established channel banks. Although some portions of the ephemeral washes present shelving with smooth-toe transitions, these features are composed of friable sand and are evidence of recent sand deposition covering the bank features.

For wetlands and other aquatic habitats occurring in California, CDFG relies on the USFWS wetland definition and classification system, which is based on *Classification of Wetland and Deepwater Habitats of the United States* (Cowardin et al. 1979). Therefore, jurisdictional wetland delineations within disturbance areas will be conducted based on the one-parameter[5] method outlined in CDFG/USFWS guidance documents and classification manual(s) to define presence and State jurisdictional extent. The Cowardin method requires diligence to avoid false positive conclusions (e.g., concluding that an area with no transitional relation to the aquatic system is a wetland based on presence of vegetation equally likely to be found in wetland or nonwetland circumstances).

Functions and Values Assessments

A qualitative assessment of the functions and values will also be conducted for ephemeral stream (i.e., xeric riparian) features identified in unsurveyed portions of proposed Project and Alternative disturbance

5. For Federal jurisdictional waters, a determination for the presence of wetland is based on the presence of three parameters occurring simultaneously at the area of investigation and study. These three wetland parameters are 1) hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology. Therefore, for State-defined wetlands, only one of these three wetland criteria is required to be present for the State to consider an aquatic feature a wetland.

areas at the Project site. This qualitative assessment utilized the Hydrogeomorphic Approach (HGM) to assess the physical, chemical, and biological functions and values of xeric riparian features utilizing a synthesis of the methodologies and definitions outlined in:

1. *A Hydrogeomorphic Classification for Wetlands* as a guide (Brinson et al. 1995)
2. *An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices* (Smith et al. 1995)
3. *Wetland Values: Concepts and Methods for Wetlands Evaluation* (USACE 1979)
4. *The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest* (U.S. Environmental Protection Agency [USEPA] 2008)
5. USEPA Watershed Academy: *Wetland Functions and Values* (USEPA 2009)
6. U.S. Geologic Survey (USGS) Water Supply Paper 2425: *Wetland Functions, Values, and Assessment* (USGS 1996)

The assessment will be based on observations made during above-mentioned jurisdictional delineation field surveys and other resource surveys (e.g. cultural, botanical, and wildlife) occurring in 2010. The assessment is intended to quantitatively evaluate ambient and projected post-project desert aquatic (including xeric riparian) features without a reference site. Since the assessment will not be based on a comparison to an actual reference site in the field, the qualitative rankings of variables used for the assessment of the quality of functions and values will be confined to the quality of the habitats within the study area.

Brinson et. al. (1995), Smith et al. (1995), and USEPA (2008) will be used as the primary guidance documents for assessing xeric riparian function, which include assessment of the following four major functional categories:

1. Hydrologic Function
2. Biogeochemical Function
3. Plant Habitat Function
4. Animal Habitat Function

USACE (1979), USEPA (2009) and USGS (1996) will be used as the primary guidance documents for assessing xeric riparian values, which include assessment of the following seven major value categories:

1. Aquifer Recharge (including Base Flow and Water Supply)
2. Flood Protection
3. Water Quality
4. Economic
5. Aesthetic
6. Recreational
7. Cultural

Xeric riparian values 1 through 4 will be incorporated within xeric riparian functions because wetland values also arise from the many ecological functions associated with wetlands (USEPA 2009). Xeric riparian values 5 through 7 will be ascertained through subjective review during the jurisdictional

delineation field assessment, a review of related documents such as cultural resources reports, the Riverside or Kern County General Plans, and speaking with resource agency personnel.

Golden Eagle Surveys

A GOEA field survey will be conducted in 2010 of the PSPP site within proposed Project and Alternative disturbance areas and within an associated buffer zone; however, these surveys are being conducted by an entity other than the AECOM Team.

Helicopter-and ground-based raptor surveys shall be conducted, following the USFWS interim guidelines for GOEA surveys (USFWS 2010), to record and report occupancy (Phase 1) and productivity (Phase 2) of resident golden eagles including, but not limited to, the following:

- individual activities,
- nests and territories on and surrounding the subject solar farm project, and within an approximate 10-mile radius of the proposed Project (assumed USFWS requirement)

The first survey (Phase 1 helicopter survey) has already been completed and a second survey (Phase 2) will begin a minimum of 30 days after the Phase 1 survey was conducted.

General Biological Survey Details

In addition to above-described protocols, the following general surveys actions/approaches will be taken by the AECOM survey team.

- While conducting biological resource surveys at the Project site in 2010 (e.g., DT surveys, WBO surveys, vegetation mapping and rare plant surveys, etc.) biologists will also be looking for and recording occurrences of all sensitive, listed, or other special-status wildlife species or their sign, including but not limited to:
    - Potential bat roosting sites—caves, abandoned buildings, cliffs etc.
    - Nelson's bighorn sheep
    - American badger (*Taxidea taxus*)
    - Mohave ground squirrel
    - Desert kit fox (*Vulpes macrotis*)
    - Mojave fringe-toed lizard (*Uma scoparia*)
    - Loggerhead shrike (*Lanius ludovicianus*)
    - Bendire's thrasher (*Toxostoma bendirei*)
    - Crissal thrasher (*Toxostoma crissale*)
    - Gilded flicker (*Colaptes chrysoides*)
    - Gila woodpecker (*Melanerpes uropygialis*)
    - Raptors
        - Northern harrier (*Circus cyaneus*)
        - White-tailed kite (*Elanus leucurus*)
        - Cooper's hawk (*Accipiter cooperii*)
        - Peregrine falcon (*Falco peregrinus*)
        - Prairie falcon (*Falco mexicanus*)
        - Swainson's hawk
        - Golden eagle
        - Ferruginous hawk (*Buteo regalis*)

- All surveyors will be given Desert Tortoise Awareness training.
- All surveyors will be briefed on potential rare plants within their survey area, including descriptions and photographs/drawings. Biologists will record coordinates and take photographs of any potential occurrences of rare plants and communicate this information to an AECOM Team botanist for verification immediately.
- Within areas of the 1-mile disturbance area (Project or Alternative) survey buffer not previously surveyed, a more general survey of habitat suitability and occurrence of special-status species and their sign will be conducted (according to the CEC's Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects [CEC 2007]), if accessible to the biologists conducting the surveys.

References

AECOM 2010. Palen Solar Power Project (09-AFC-9) CEC Staff Data Requests Set 1 filed on December 7, 2009.

Baldwin, B., S. Boyd, B. Ertter, R. Patterson, T. Rosatti, and D. Wilken. 2002. The Jepson Desert Manual: Vascular Plants of Southeastern California. Univ. of California Press Wilken, Berkeley.

Brinson, M., R. Rheinhardy, F. Hauer, L. Lee, W. Nutter, R. Smith, and D. Whigham. 1995. A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands. U.S. Army Corps of Engineers Waterways Experiment Station. Wetlands Research Program Technical Report WRP-DE-11. December 1995 – Operation Draft.

Bureau of Land Management (BLM). 2002. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan. Available at http://www.blm.gov/ca/news/pdfs/ neco2002/Table%20of%20Contents.pdf.

Bureau of Land Management (BLM). 2009. California BLM Special-Status Plants – (All) as of 3/26/09. Available at http://www.blm.gov/ca/pa/ssp/lists/by_species/ssplist_all.html. Accessed June 29, 2009.

California Burrowing Owl Consortium (CBOC). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April.

California Department of Fish and Game (CDFG). 1996. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities. Revised May 8, 2000.

California Department of Fish and Game (CDFG). 2003. California Department of Fish and Game Wildlife Habitat Data Analysis Branch. The Vegetation Classification and Mapping Program – List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database. Available at http://www.dfg.ca.gov/whdab/ pdfs/natcomlist.pdf. September.

California Department of Fish and Game (CDFG). 2009a. California Department of Fish and Game. RareFind 3 computer program. California Natural Diversity Database (CNDDB) California Department of Fish and Game, State of California Resources Agency. Sacramento, California.

California Department of Fish and Game (CDFG). 2009b. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Revised November 24, 2009.

California Energy Commission (CEC). 2007a. Recommended Biological Resources Field Survey Guidelines for Large Solar Projects (Draft).

California Energy Commission (CEC). 2007b. Rules of Practice and Procedure & Power Plant Site Certification Regulations. Siting Regulations.

California Invasive Plant Council (Cal-IPC). 2009. Invasive Plants of California's Wildland: Plants listed by category. Available at http://www.cal-ipc.org/ip/management/ipcw/ categories.php#cala. Accessed on July 5, 2009.

California Native Plant Society (CNPS). 2001. CNPS Botanical Survey Guidelines. Pages 38–40 in California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (D.P. Tibor, editor). Sixth edition. Special Publication No. 1, California Native Plant Society, Sacramento, 387 pp.

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants of California, California Native Plant Society, Sacramento, California. Available at http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Search?search={CNPS_LIST}%20= ~%20m/./i. Accessed June 29, 2009 (version v7-09b 4-10-09).

Cowardin, L., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of Interior. U.S. Fish and Wildlife Service. FWS/OBS-79/31. December.

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.

Environmental Laboratory. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). September.

Hickman, J., Editor. 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley, California.

Holland, R. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame Heritage Program, State of California Department of Fish and Game.

LaPre, Larry. 2009. Personal communication via email from BLM to map specific cactus species. March.

Lichvar, R.W., Finnegan, D.C., Ericsson, M.P., and Ochs, W. 2006. Distribution of Ordinary High Water Mark (OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" in arid southwestern channels. ERDC/CRREL TR-06-5.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante. 1993. Handbook of Field Methods for Monitoring Landbirds. General Technical Report PSW-GTR-144, Pacific Southwest Research Station, Albany, California.

Sawyer, J.O., and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, California.

Smith, D. R., A. Ammann, C. Bartoldus, and M. M. Brinson. 1995An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A307 121.

U.S. Army Corps of Engineers (USACE) 1979. Wetland Values: Concepts and Methods for Wetlands Evaluation. Research report 79-R1, U.S. Army Corps of Engineers, Institute for Water Resources, Fort Belvoir, Virginia.

U.S. Army Corps of Engineers (USACE) 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual ERDC/CRREL TR-08-12.

U.S. Environmental Protection Agency (USEPA). 2008 The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. Office of Research and Development.

U.S. Environmental Protection Agency (USEPA). 2009 Watershed Academy http://www.epa.gov/watertrain/index.htm.

U.S. Geological Survey (USGS) 1996 Water Supply Paper 2425: Wetland Functions, Values, and Assessment. Available at: http://water.usgs.gov/nwsum/WSP2425/functions.html.

U.S. Fish and Wildlife Service (USFWS). 1992. Field Survey Protocol for Any Federal Action That May Occur within the Range of the Desert Tortoise.

U.S. Fish and Wildlife Service (USFWS). 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species. January.

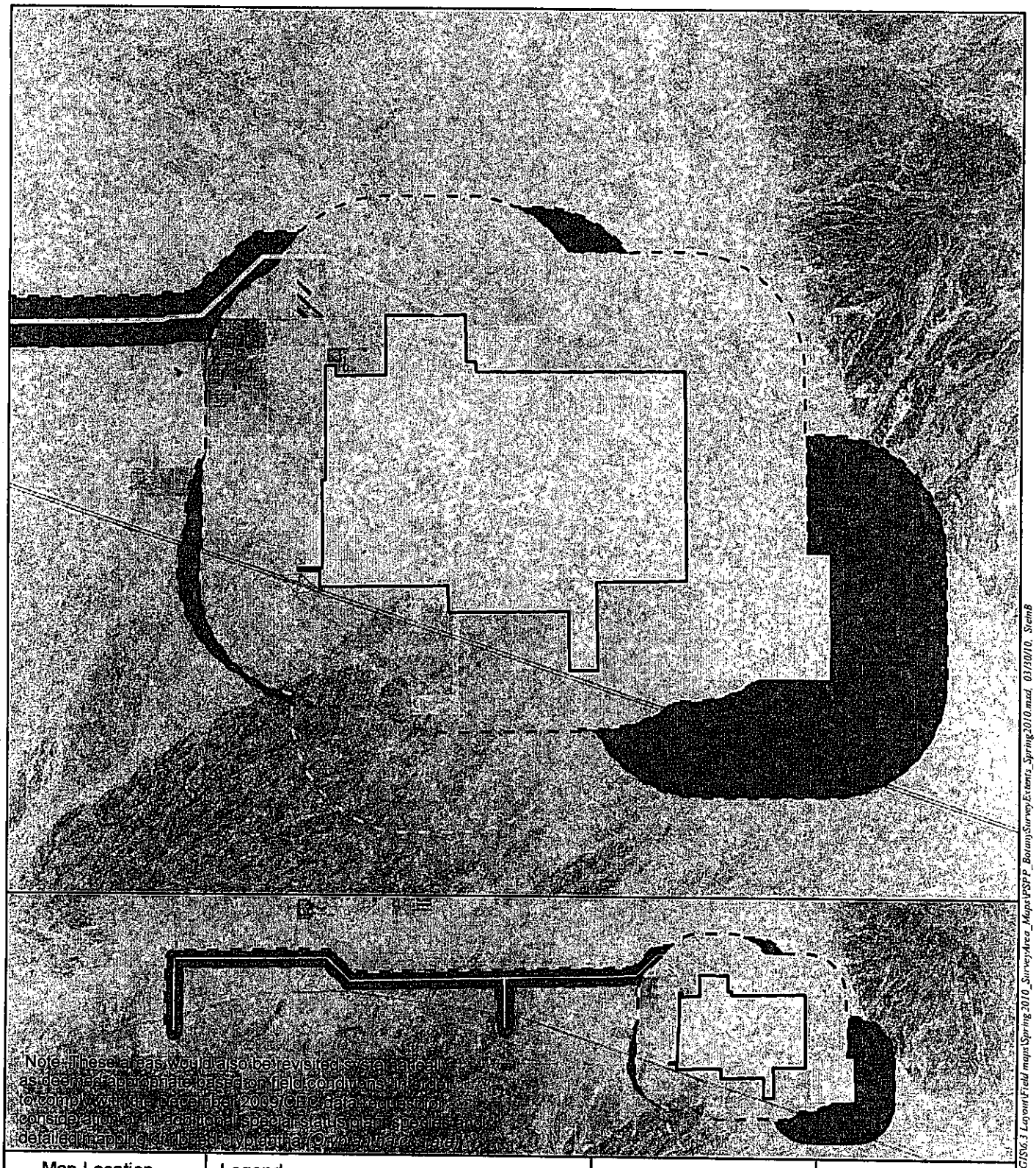
U.S. Fish and Wildlife Service (USFWS). 2009. Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*), April.

U.S. Fish and Wildlife Service (USFWS). 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitorin Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. February.

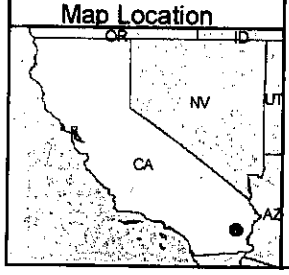
Whiteaker, L., J. Henderson, R. Holmes, L. Hoover, R. Lesher, J. Lippert, E. Olson, L. Potash, J. Seevers, M. Stein, and N. Wogen. 1998. Survey Protocols for Survey and Manage Strategy 2: Vascular Plants. Available at http://www.blm.gov/or/plans/surveyand manage/SP/VascularPlants/cover.htm.

Attachment 1

Figures



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)[1]
- Survey Areas (Spring 2010)
- BRSA (Surveyed 2009)
- BRSA (March 2010)
- Buffer Survey Areas (Spring 2010)

0 6,000 12,000 Feet

Palen Solar Power Project
Figure P-3

Vegetation Mapping and Rare Plant Survey Areas Spring 2010

Source: NAIP 2009; AECOM 2010

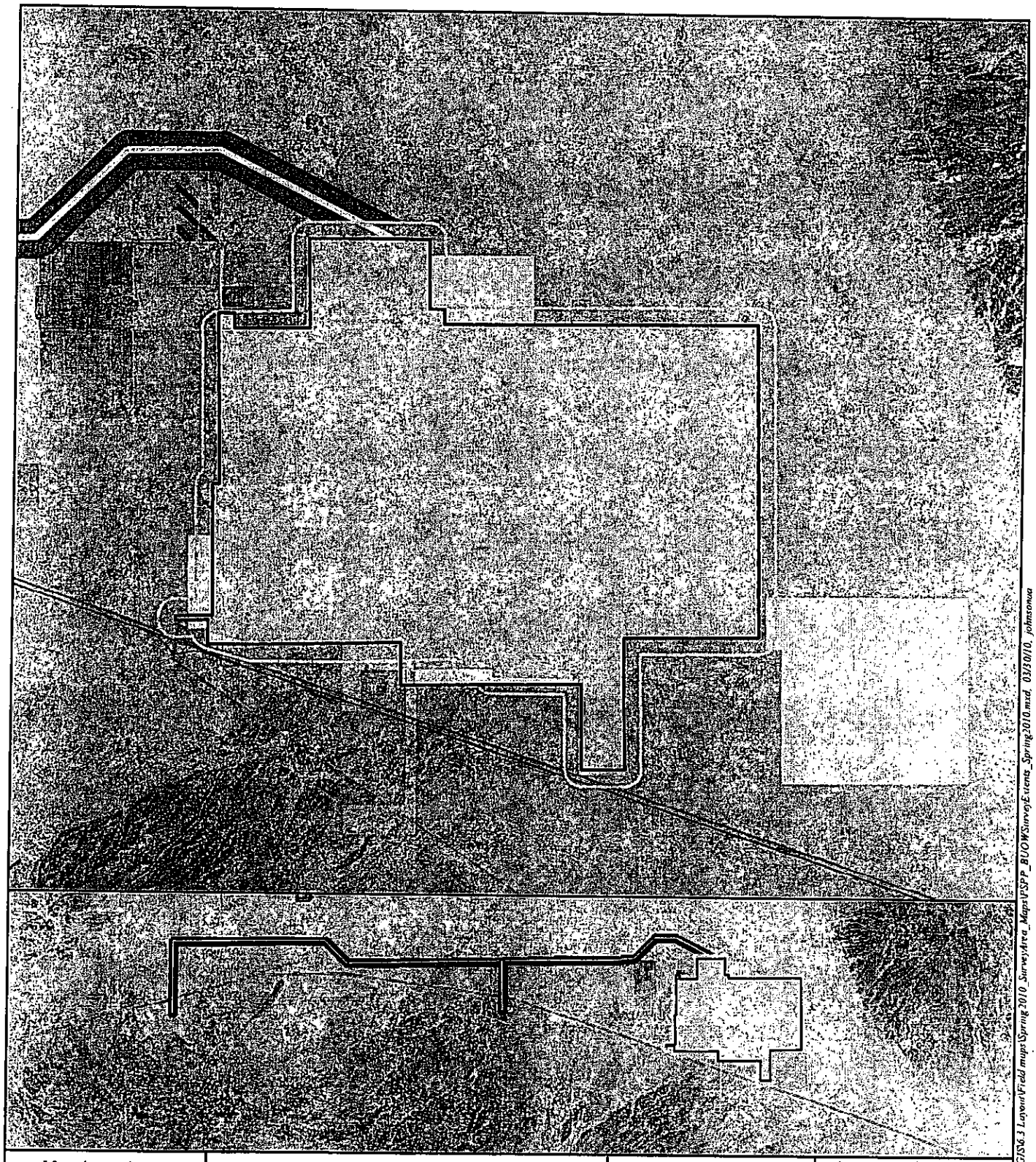
1 inch = 6,000 feet

N W E S

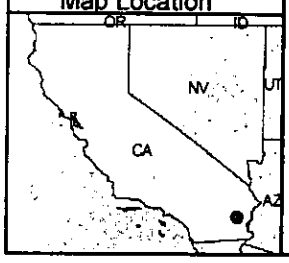
AECOM

Date: March 2010

Path: P:\60909\60808081 Sol Mil Palen\6.0 GIS\6.3 Layout\Field maps\Spring 2010_SurveyArea_Maps\PSPP_BotanySurveyExtents_Spring2010.mxd, 03/30/10, SteinB



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)
- Survey Areas (Spring 2010)
- Buffer Survey Extent (2009)
- Buffer Survey Areas (Spring 2010)

0 4,000 8,000 Feet

Palen Solar Power Project
Figure P-2

WBO Survey Areas Spring 2010

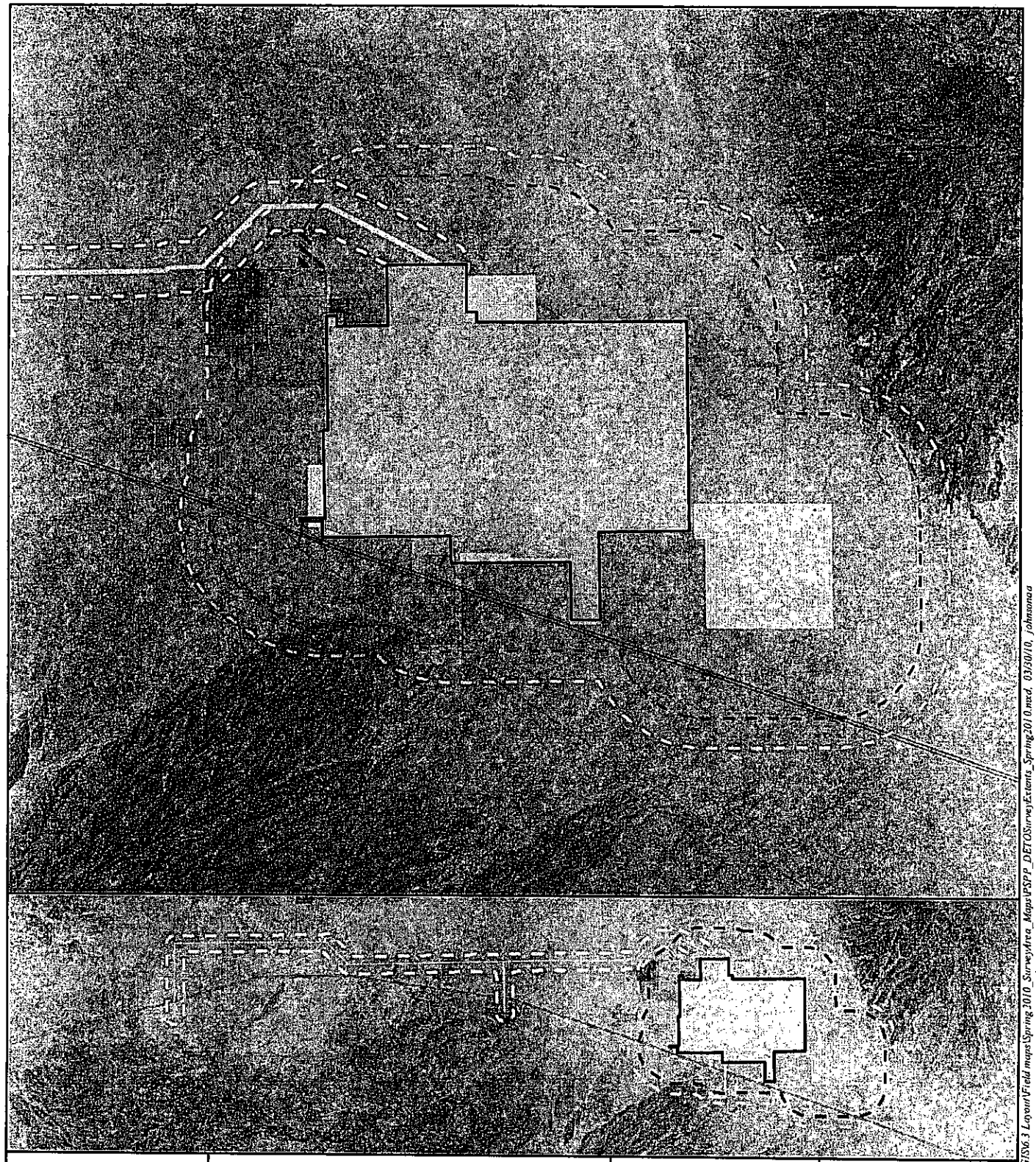
Source: AECOM 2010; NAIP 2009

1 inch = 4,000 feet

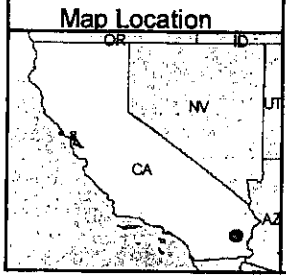
AECOM

Date: March 2010

Path: P:\2009\09080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Field maps\Spring 2010_Survey Area_Maps\PSP_BUOWSurveyExtents_Spring2010.mxd, 03/30/10, johnsonna



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)
- Survey Areas (Spring 2010)
- 1000-foot BufferTransect (Spring 2010)
- 0.75-mile BufferTransect (Spring 2010)
- 1-mile BufferTransect (Spring 2010)

0 6,000 12,000 Feet

Palen Solar Power Project
Figure P-1

DT Survey Areas Spring 2010

Source: AECOM 2010; NAIP 2009

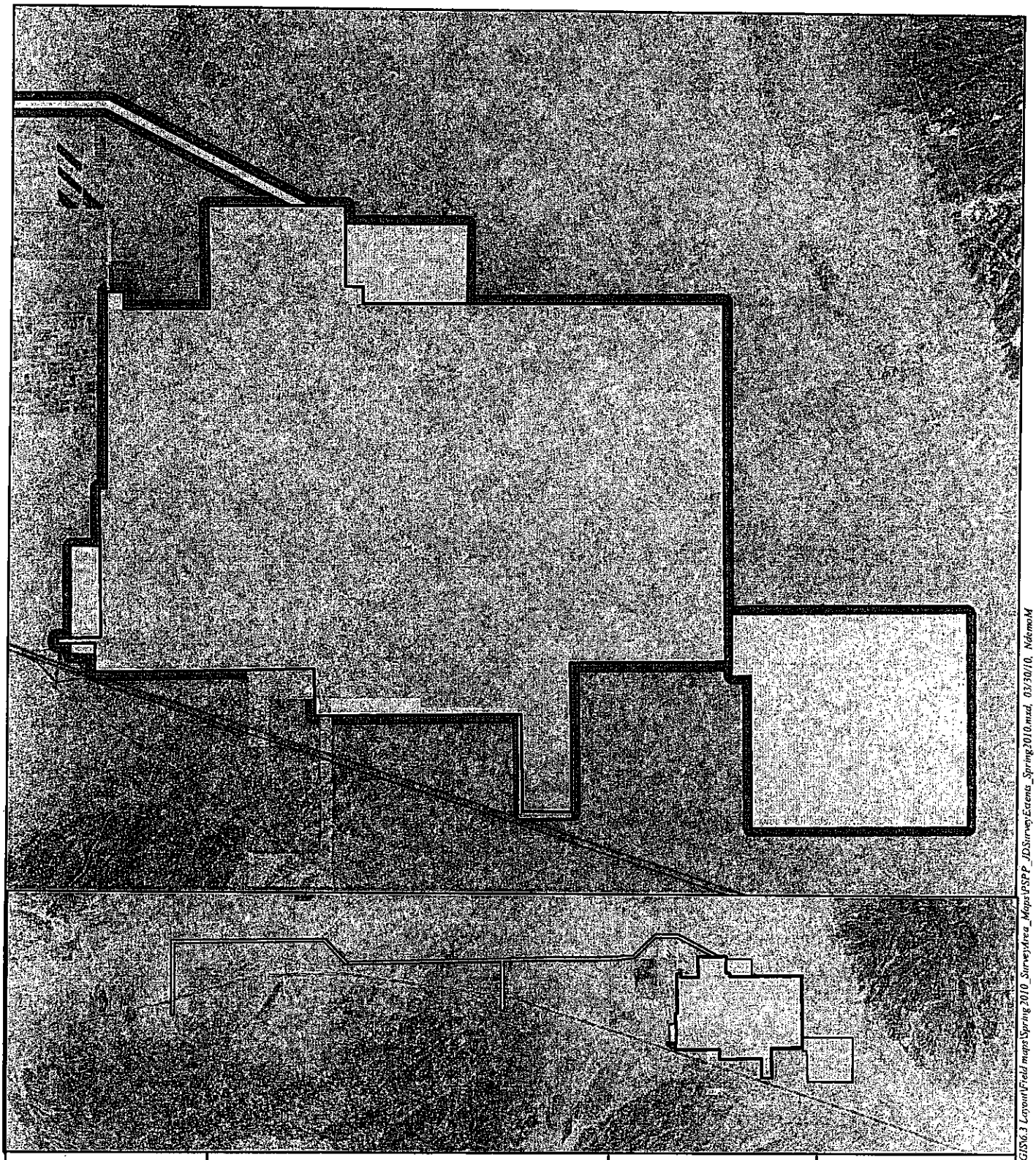
1 inch = 6,000 feet

N W E S

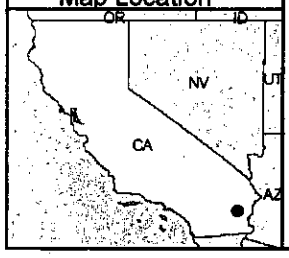
AECOM

Date: March 2010

Path: P:\200909080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Field maps\Spring 2010_SurveyArea_Maps\PSPP_DETOSurveyExtents_Spring2010.mxd, 03/30/10, johnsonea



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)
- Survey Areas (Spring 2010)
- Buffer Survey Areas (Spring 2010)

0 3,500 7,000 Feet

Palen Solar Power Project
Figure P-4

Jurisdictional Waters Survey Areas Spring 2010

Source: AECOM 2010; NAIP 2009

1 inch = 3,500 feet

AECOM

Date: March 2010

Path: P:\200909080081 Sol Mil Palen\6.0 GIS\6.3 Layout\Field maps\Spring 2010_SurveyArea_Maps\PSPP_JDSurveyExtents_Spring2010.mxd, 03/30/10, NdemoM

Attachment 2

Target List of Special Status Plant Species for 2010 Surveys

Attachment 2
Target List of Special Status Plant Species for 2010 Surveys
Palen Solar Power Project

Scientific Name	Common Name	Status[3]	Expected Fall or Spring[4]
Acleisanthes longiflora	Angel trumpets	CNPS List 2.3 NECO	Spring
Androstephium breviflorum[1]	small-flowered androstephium	CNPS List 2.2	Spring
Astragalus insularis var. harwoodii	Harwood's milkvetch	CNPS List 2.2 NECO	Spring
Astragalus lentiginosus var. coachellae	Coachella Valley milkvetch	ESA: Threatened CNPS List 1B.2	Spring
Ayenia compacta[1]	California ayenia	CNPS List 2.3	Spring
Calliandra eriophylla	Fairyduster	CNPS List 2.3 NECO	Spring
Calochortus striatus	Alkali mariposa-lily	CNPS: List 1B.2 BLM: Sensitive	Spring
Castela emoryi	Crucifixion thorn	CNPS List 2.3 NECO	Spring
Chamaesyce abramsiana[1]	Abram's spurge	CNPS List 2.2	Fall
Chamaesyce platysperma[1]	Flat-seeded spurge	CNPS List 1B.2	Fall
Colubrina californica	Las Animas colubrine	CNPS List 2.3 NECO	Spring
Condalia globosa var. pubescens[1]	bitter snakewood	CNPS List 4.2	Spring
Corypantha alversonii	Foxtail cactus	CNPS List 4.3 NECO	Spring
Cryptantha costata[1]	ribbed cryptantha	CNPS List 4.3	Spring
Cryptantha holoptera[1]	winged cryptantha	CNPS List 4.3	Spring
Cynanchum utahense	Utah milkvine	CNPS List 4.3 NECO	Spring
Ditaxis claryana	glandular ditaxis	CNPS List 2 .2 NECO	Spring or Fall
Ditaxis serrata var. californica	California ditaxis	CNPS List 3.2 NECO	Spring or Fall
Echinocactus polycephalus var. polycephalus[2]	cottontop cactus	No special status (considered but rejected)	Spring
Echinocereus engelmannii[2]	hedgehog cactus	CNPS List 1B.1 (var. *howei*)	Spring
Echinocereus triglochidiatus[2]	hedgehog cactus	No special status	Spring
Eriastrum harwoodii[1]	Harwood's woollystar	CNPS List 1B.2	Spring

Scientific Name	Common Name	Status[3]	Expected Fall or Spring[4]
Ferocactus cylindraceus[2]	California barrel cactus	No special status	Spring
Horsfordia alata[1]	pink velvet mallow	CNPS List 4.3	Spring or Fall
Hymenoxys odorata[1]	bitter hymenoxys	CNPS List 2	Spring or Fall
Imperata brevifolia	California satintail	CNPS List 2.1	Spring or Fall
Matelea parvifolia[1]	spearleaf	CNPS List 2.3	Spring
Mentzelia puberula[1]	Argus blazing star	No special status (taxonomy unresolved)	Spring
Physalis lobata[1]	lobed ground cherry	CNPS List 2.3	Fall
Portulaca halimoides[1]	desert portulaca	CNPS List 4.2	Fall
Proboscidea althaeifolia[1]	desert unicorn plant	CNPS List 4.3	Spring
Salvia greatae	Orocopia sage	CNPS List 1B.3 NECO	Spring
Selaginella eremophila	Desert spikemoss	CNPS List 2.2	Spring
Senna covesii	Coves' cassia	CNPS List 2.2 NECO	Spring
Teucrium cubense ssp. *depressum*	dwarf germander	CNPS List 2.2	Spring
Wislizenia refracta ssp. *refracta*	Jackass clover	CNPS List 2.2 NECO	Spring or Fall
Xylorhiza orcuttii	Orcutt's Woody-aster	CNPS List 1B.2 BLM Sensitive	Spring

1. Species requested to be surveyed by CEC (AECOM 2010)
2. Species requested to be surveyed by BLM (LaPre 2009)
3. Sensitivity Status Key

ESA Federal Endangered Species Act (ESA) Threatened

CNPS California Native Plant Society Lists:

1B: Considered rare, threatened, or endangered in California and elsewhere

2: Plants rare, threatened, or endangered in California, but more common elsewhere

3: Plants for which we need more information – Review list

4: Plants of Limited Distribution – A Watch list

Decimal notations: .1 – Seriously endangered in California, .2 – Fairly endangered in California, .3 – Not very endangered in California

BLM Special Status Plants (Palm Springs Field Office)

NECO Special-status species considered in analysis of the Northern and Eastern Colorado Coordinated Management Plan (BLM 2002).

4. Based on the known blooming periods of these plant species, many of these species are opportunistic with respect to rainfall. While they have been listed in this table as occurring Spring, Fall, or Both, actual blooming times will correlate more closely with the climate than the calendar. Field surveys will be comprehensive, not selective; all plants on this list will be considered during all surveys, regardless of the probability of finding them. A complete floral inventory will be recorded for the site as well.

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of: **APPLICATION FOR CERTIFICATION for the *PALEN SOLAR POWER PROJECT***	**Docket No. 09-AFC-7** **PROOF OF SERVICE** ***(Revised 12/28/2009)***

APPLICANT

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillenium.com

Elizabeth Ingram, Associate Developer, Solar Millennium
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
berg@solarmillennium.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste 360
Pasadena, CA 91105
rambatipudi@chevron.com

APPLICANT'S CONSULTANT

Arrie Bachrach
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
arrie.bachrach@aecom.com

COUNSEL FOR APPLICANT

Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL FOR APPLICANT

Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive Palm Springs, CA 92262
CAPSSolarPalen@blm.gov

California ISO
e-recipient@caiso.com

INTERVENORS

Tanya A. Gulesserian,
Marc D. Joseph, Jason W. Holder
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

Michael E. Boyd, President
Californians for renewable Energy, Inc
5439 Soquel Drive
Soquel, CA 95073-2659
michaelboyd@sbcglobal.net

Alfredo Figueroa
Californians for Renewable Energy, Inc.
424 North Carlton
Blythe, CA, 92225
lacunadeaztlan@aol.com

ENERGY COMMISSION

Robert Wiesenmiller
Commissioner and Presiding Member
jbyron@energy.state.ca.us

Kristy Chew, Adviser to Commissioner Byron
kchew@energy.state.ca.us

Karen Douglas
Chairman and Associate Member
kldougla@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Siting Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jenifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Carl Lindner, declare that on, April 22, 2010, I served and filed copies of the attached Palen Solar Power Project materials:

Palen Spring Survey Protocol Notification
Technical Area: Biological Resources

The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_palen]

The document has been sent to 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;

_____ by personal delivery or by overnight delivery service or depositing in the United States mail at Camarillo, California with postage or fees 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 respectively, to the address below (preferred method);

OR

_____ depositing in the mail an original and 12 paper copies, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-7
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

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

Carl E. Lindner

EXHIBIT 313

May 10, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Draft Summary: Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants, and Jurisdictional Waters – Blythe Solar Power Project
Technical Area: Biological Resources

Dear Mr. Solomon:

Attached please find the Draft Summary: 2010 Spring Survey Results for Desert Tortoise, Rare Plants, and Jurisdictional Waters for the Blythe Solar Power Project.

If you have any questions on this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-4611
tel (1) 510-524-4517
fax (1) 510-524-5516
Info@SolarMillennium.com
http://www.SolarMillennium.com

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 *BLYTHE SOLAR POWER PLANT PROJECT*

Docket No. 09-AFC-6

PROOF OF SERVICE
(Revised 5/3/10)

APPLICANT
Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillennium.com

Elizabeth Ingram, Associate Developer, Solar Millennium, LLC
1625 Shattuck Avenue
Berkeley, CA 94709
ingram@solarmillennium.com

Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
carl.lindner@aecom.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

Co-COUNSEL
Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL
Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES
California ISO
e-recipient@caiso.com

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262 Office
CAPSSolarBlythe@blm.gov

INTERVENORS
*** California Unions for Reliable Energy (CURE)**
c/o: Tany A. Gulesserian, Elizabeth Klebaner
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gate Way Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

ENERGY COMMISSION
KAREN DOUGLAS
Chairman and Presiding Member
kldougla@energy.state.ca.us

ROBERT WEISENMILLER
Commissioner and Associate Member
rweisenm@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Siting Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Solar Millennium declare that on May 10, 2010, I served and filed a copy of the attached Draft Summary Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants & Jurisdictional Waters. The original document, filed with the Docket Unit is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [http://www.energy.ca.gov/sitingcases/solar_millennium_blythe]

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;

_____ by personal delivery;

_____ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date 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-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

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

Alice Harron
Senior Director, Development
Solar Millennium LLC

AECOM

AECOM
1420 Kettner Boulevard
Suite 500
San Diego, CA 92101
www.aecom.com

619.233.1454 tel
619.233.0952 fax

May 7, 2010

Ms. Susan Sanders
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Dear Ms. Sanders:

Subject: Blythe Solar Power Project (09-AFC-6) – Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants and Jurisdictional Waters

On behalf of Palo Verde Solar I, LLC, AECOM is submitting preliminary results of biological surveys conducted for desert tortoise (*Gopherus agassizii*; DT), rare plants, and jurisdictional waters for the Blythe Solar Power Project. This information was requested at the Palen and Blythe Staff Workshops conducted on April 28 and 29, 2010.

The preliminary results are presented in the tables and figures attached. Table 1 presents a summary of the observations of DT sign and DT occurrences noted during spring 2010 surveys. Table 2 presents the rare plant population counts observed during spring 2010 surveys. Results from the fall and spring 2009 surveys are not included in DT and rare plant tables or the figures attached. However, the Jurisdictional Waters map does include results from the 2009 surveys and a table presenting the results of both survey years is provided in the figure. Please note that the totals provided in the tables herein are simply the results of our observations. These tables do not represent total impacts nor is this an impact analysis. Comprehensive technical reports and impact analyses are currently being prepared and will be submitted to the CEC in early June.

Please let us know if you have any questions.

Sincerely,

Bill Graham
Vice President

Attachments: Table 1. Blythe Solar Power Project Desert Tortoise Observations Spring 2010
Table 2. Blythe Solar Power Project Rare Plant Populations Counts Spring 2010
Figure. Preliminary Results Desert Tortoise Spring 2010 Surveys
Figure. Preliminary Results Botany Rare Plants Spring 2010 Surveys
Figure. Preliminary Results State Waters Spring 2010 Surveys
CD. Raw Data Files

cc: Alice Harron, Solar Millennium
Elizabeth Ingram, Solar Millennium
Scott Galati, Solar Millennium Counsel
Mark Luttrell, AECOM

Table 1. Blythe Solar Power Project Desert Tortoise Observations Spring 2010

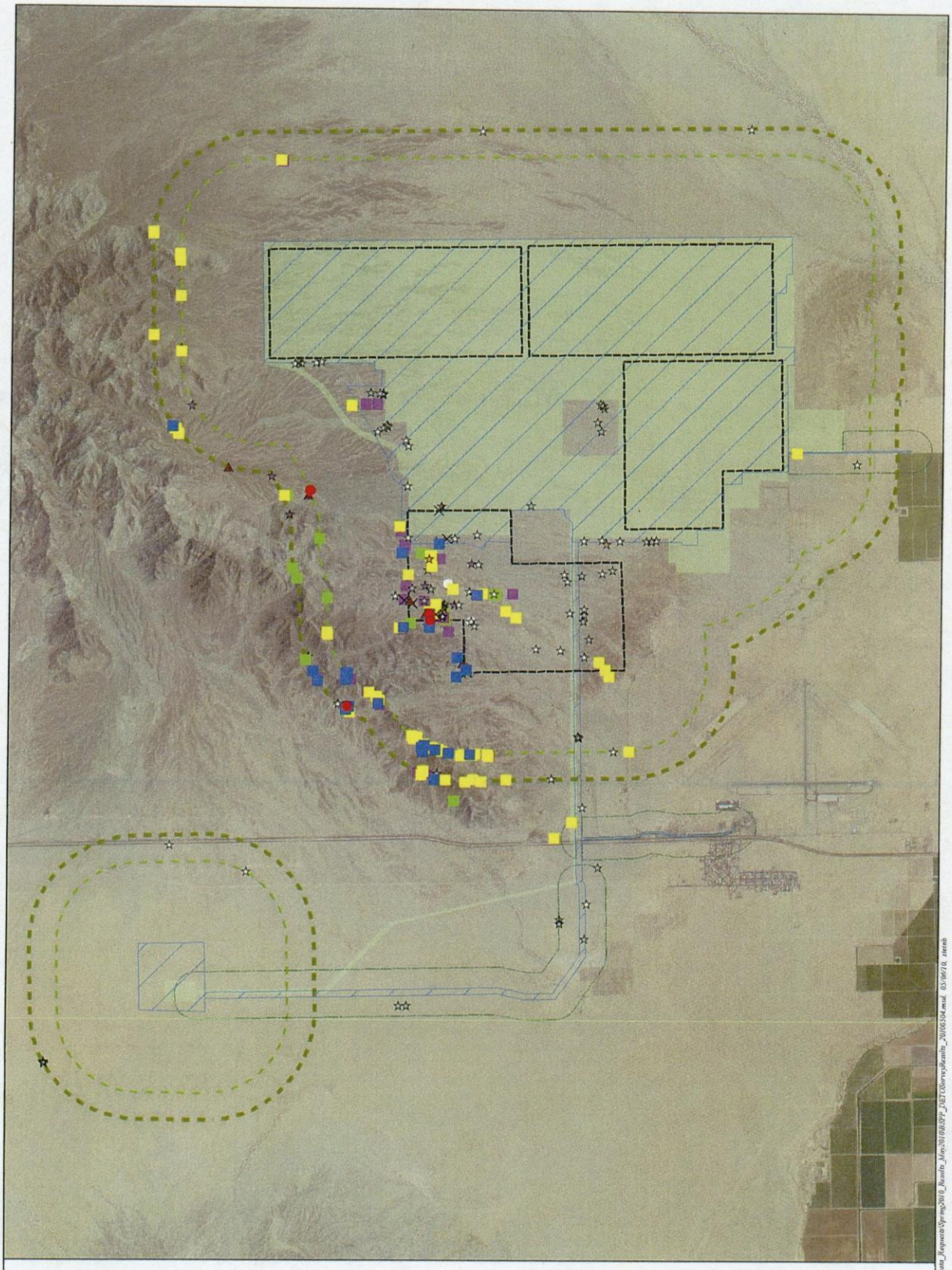
Description	Proposed Project Study Area	Reconfigured Alternative Project Study Area	Proposed Project/Reconfigured Alternative Study Area[1]	Buffer	Incidental Observations Outside Buffer Area	Grand Total
Adult Tortoise		1		2		3
Adult Tortoise - Second Observation		1				1
Active Tortoise Burrow or Pallet - Class 1		3	1	22	4	30
Tortoise Burrow or Pallet - Class 2 (good condition, no evidence of recent use)	2	4		20	1	27
Tortoise Burrow or Pallet - Class 3 (deteriorated, definitely tortoise)		5		5	3	13
Possible Tortoise Burrow or Pallet (Class 4 or 5)		13		50	9	72
Tortoise Scat		2		2	1	5
Fossilized Turtle/Tortoise Bone		1		1		2
Tortoise Bone Fragment - Mineralized	10	10		6		26
Tortoise Bone Fragment - Not Mineralized	20	22	3	17	2	64
Tortoise Carcass (not disarticulated and scattered)	1	4		5		10
Tortoise Egg Shell Fragment		3				3
Tortoise Tracks	1	3	2	1		7
Tortoise Drinking Depression		1				1

[1]This encompasses the areas where the Proposed Project Study Area and Reconfigured Alternative Study Area overlap.

Table 2. Blythe Solar Power Project Rare Plant Population Counts Spring 2010[1]

Species	Proposed Project Study Area	Reconfigured Alternative Project Study Area	Propose Project/Reconfigured Alternative Study Area[2]	Buffer	Incidental Observations Outside Buffer Area	Grand Total
Coachella Valley milkvetch				14		14
Cottontop cactus	1		5	10		16
Harwood's milkvetch	677	60	128	1,823	60	2,748
Harwood's wollystar	2,134			1,287	8	3,429
Proboscidea althaeifolia	4	15	6	1		26
Ribbed cryptantha	32,367			37,377	1,909	71,653
Utah milkvine	14	78	12	526		630
Winged cryptantha				15		15

[1] Note that each point on the figure may represent multiple individuals
[2] This encompasses the areas where the Proposed Project Study Area and Reconfigured Alternative Study Area overlap.



DT Observations (Spring 2010)

- Adult Tortoise
- Adult Tortoise - Second Observation
- Active Tortoise Burrow or Pallet - Class 1
- Tortoise Scat
- Tortoise Tracks
- Fossilized Turtle/Tortoise Bone
- Possible Tortoise Burrow or Pallet (Class 4 or 5)
- Tortoise Bone Fragment - Mineralized
- Tortoise Bone Fragment - Not Mineralized
- Tortoise Burrow or Pallet - Class 2 (good condition, no evidence of recent use)
- Tortoise Burrow or Pallet - Class 3 (deteriorated, definitely tortoise)
- Tortoise Carcass (not disarticulated and scattered)
- Tortoise Drinking Depression
- Tortoise Egg Shell Fragment

Map Location

Legend

- Project Study Area
- Reconfigured Alternative Study Area
- Study Area (Surveyed in 2009)
- Buffer Transect 1000-foot
- Buffer Transect 3/4-mile
- Buffer Transect 1-mile

0 4,500 9,000 Feet

Blythe Solar Power Project

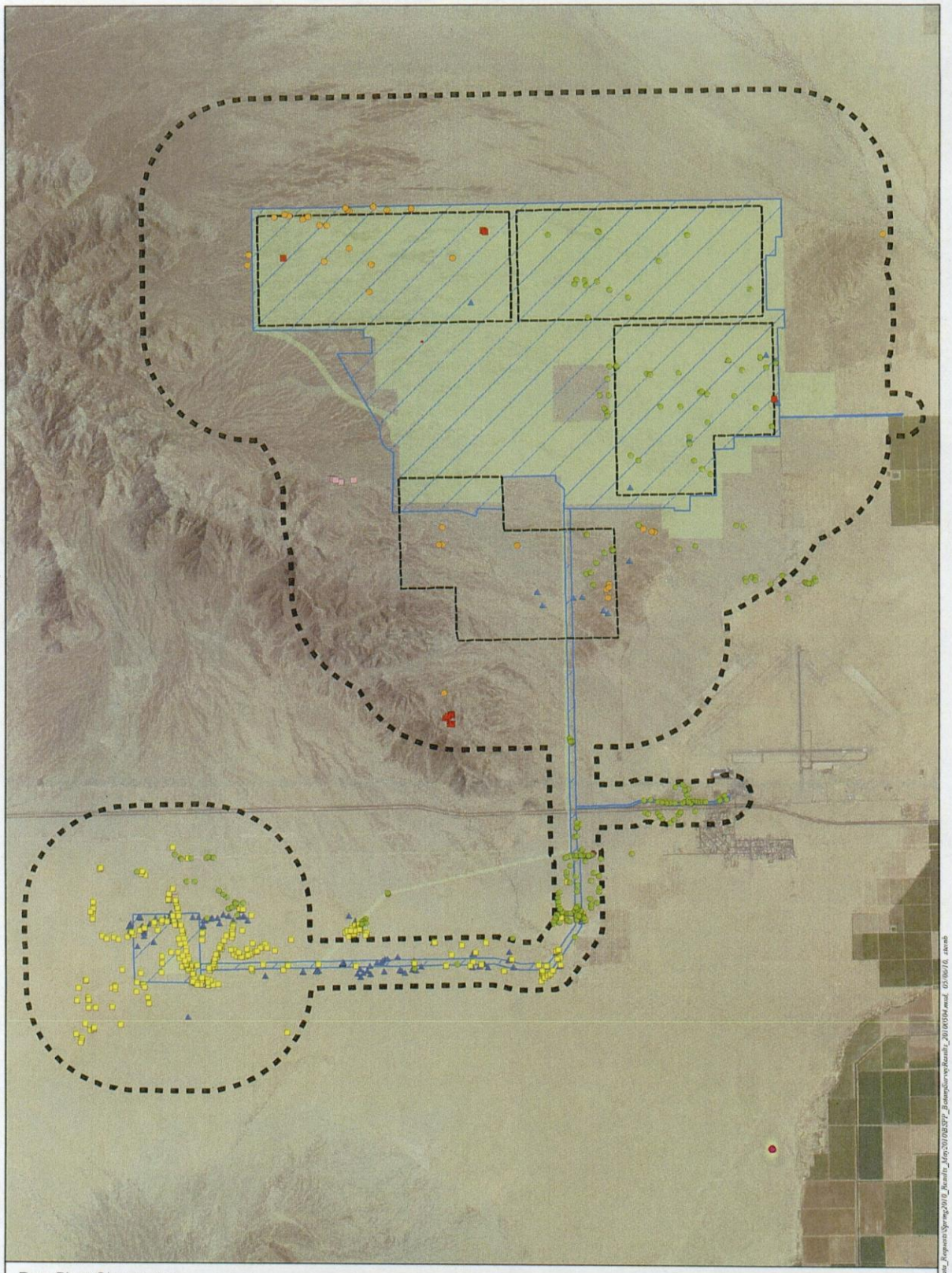
Preliminary Results Desert Tortoise Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010



Rare Plant Observations

- Coachella Valley milkvetch
- winged cryptantha
- cottontop cactus
- Proboscidea althaeifolia
- Utah milkvine
- Harwood's wollystar
- ribbed cryptantha
- Harwood's milkvetch
- Study Area (Surveyed in 2009)

Map Location

Legend

- Project Study Area
- Reconfigured Alternative Study Area
- Study Area (Surveyed in 2009)
- BRSA

0 4,500 9,000 Feet

Blythe Solar Power Project

Preliminary Results Botany Rare Plants Spring 2010 Surveys

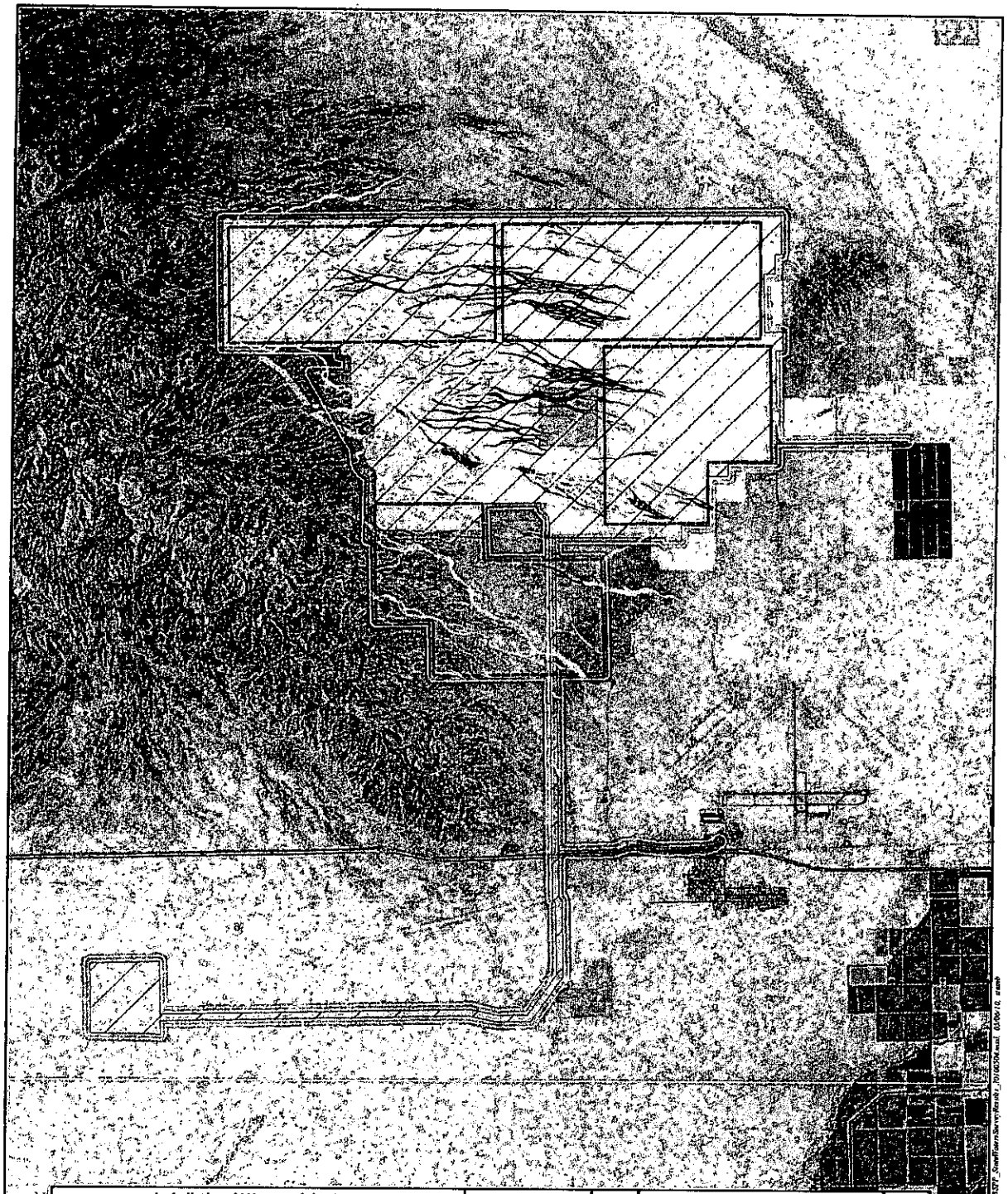
Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010

Path: P:\26009\60600002.3d\101 Blythe\6.0 GIS\6.3 Layout\Reports\CBE_Data_Requests\Spring2010_Results_Map\2010\SPP_BotanySurveyResults_2010\0304.mxd 05/06/10 ztcrab



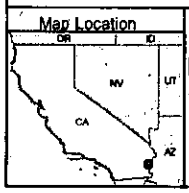
Jurisdictional Waters of the State		Project Study Area	Buffer	Reconfigured Alternative Study Area	Buffer
Desert Dry Wash Woodland	Wash Dependant Vegetation	8.4	0.2	0.7	0.4
	Riparian Interfluve	23.8	0.0	3.5	
	Vegetated Ephemeral Dry Wash	279.9	36.8	143.8	27.7
Other Waters	Unvegetated Ephemeral Dry Wash	9.2	1.5	5.0	1.5
	Swale	416.8	6.5	235.9	21.6

Jurisdictional Waters of the State of California

Desert Dry Wash Woodland
- Wash Dependent Vegetation
- Riparian Interfluve
- Vegetated Ephemeral Dry Wash

Other Waters
- Swale
- Unvegetated Ephemeral Dry Wash
- Study Area (Surveyed in 2009)

Map Location



Legend
- Project Study Area
- Reconfigured Alternative Boundary
- 250-foot Buffer Study Area
- Study Area (Surveyed in 2009)

0 4,500 9,000 Feet

Blythe Solar Power Project

Preliminary Results State Waters Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010

EXHIBIT 314

DOCKET
09-AFC-6
DATE MAY 14 2010
RECD. MAY 20 2010

May 14, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Responses to Questions from the April 28, 29 and May 7, 2010 CEC Workshops
Preliminary Biological Survey Results – Spring 2010
Technical Areas: Biological resources

Dear Mr. Solomon:

Attached please find the following response to questions generated at the April 28, 29, and May 7, 2010 CEC Workshops for the Blythe Solar Power Project.

If you have any questions on this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-4611
tel (1) 510-524-4517
fax (1) 510-524-5516
Info@SolarMillennium.com
http://www.SolarMillennium.com

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION

In the Matter of:
APPLICATION FOR CERTIFICATION
for the *BLYTHE SOLAR POWER PROJECT*

Docket No. 09-AFC-6
PROOF OF SERVICE
(Revised 4/19/2010)

APPLICANT

Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillenium.com

Elizabeth Ingram
Developer, Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709
ingram@solarmillennium.com

APPLICANT'S CONSULTANT

Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
carl.lindner@aecom.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste 360
Pasadena, CA 91105
rambatipudi@chevron.com

CO-COUNSEL FOR APPLICANT

Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive Palm Springs, CA 92262
CAPSSolarPalen@blm.gov

California ISO
e-recipient@caiso.com

INTERVENORS

California Unions for Reliable Energy (CURE)
Tanya A. Gulesserian,
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

ENERGY COMMISSION

Karen Douglas
Chair and Presiding Member
kldougla@energy.state.ca.us

Robert Weisenmiller
Commissioner and Associate Member
rweisenm@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Carl Lindner, declare that on, May 14, 2010, I served and filed copies of the attached Blythe Solar Power Project Materials:

Responses to Questions from the April 28, 29 and May 7, 2010 CEC Workshops –
Preliminary Biological Survey Results
Technical Areas: Biological Resources

The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[http://www.energy.ca.gov/sitingcases/solar_millennium_blythe].

The document has been sent to 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;

_____ by personal delivery or by overnight delivery service or depositing in the United States mail at Camarillo, California with postage or fees 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, along with 13 CDs, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

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

Carl E. Lindner

AECOM

AECOM
1420 Kettner Boulevard
Suite 500
San Diego, CA 92101
www.aecom.com

619.233.1454 tel
619.233.0952 fax

May 14, 2010

Ms. Susan Sanders
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Subject: Blythe Solar Power Project (09-AFC-6) – Preliminary Spring 2010 Survey Results Corrected and Preliminary Impact Calculations for Biological Resources

Dear Ms. Sanders:

On behalf of Palo Verde Solar I, LLC, AECOM is submitting preliminary results of biological surveys conducted in spring 2010 for desert tortoise (*Gopherus agassizii*; DT), rare plants, jurisdictional waters, and incidental wildlife occurrences for the Blythe Solar Power Project. This information was requested at the Palen and Blythe Staff Workshops conducted on April 28 and 29, 2010. Additional information was also requested in a letter from Susan Sanders to Alan Solomon dated May 12, 2010.

Preliminary survey results for DT, rare plants and jurisdictional waters were submitted to the CEC on May 7, 2010. The results provided herein supersede the results provided on May 7, 2010. The previous survey results incorrectly included Coachalla Valley milk-vetch (*Astragalus lentiginosus var. coachellae*) as part of the rare plant botanical survey results. The proper identification of these occurrences is *Astragalus insularis* var. *harwoodii* (Harwood's milkvetch), a CNPS List 2.2 plant species. In addition, the results provided herein include an additional two mile segment of the gen-tie transmission line that was not previously reported. Surveys for jurisdictional waters have been completed and included herein for the additional transmission line; however, surveys for DT and rare plants are currently being conducted for this area. Therefore, the complete results of additional two mile segment of the transmission line will be provided in final technical reports to be submitted to the CEC in early June.

The preliminary survey results are presented in figures and tables attached. Table 1 and Figure 1 present a summary of observations of DT sign and DT occurrences noted during spring 2010 surveys. Table 2 and Figure 2 present the rare plant population counts observed during spring 2010 surveys. Figure 3 presents the results of a formal jurisdictional delineation of waters of the State. Table 3 and Figure 4 present incidental wildlife occurrences observed during protocol surveys for DT, rare plants, western burrowing owl, and jurisdictional waters. Results from the fall and spring 2009 surveys are not included in the tables and figures for DT, rare plants or incidental wildlife occurrences. However, the jurisdictional waters figure does include results from the 2009 surveys and a table presenting the results of both survey years is provided in the figure. Please note that the results provided in Tables 1 through 3 and Figures 1 through 4 are simply the results of our observations within the 100 percent coverage study area and associated buffers. These tables and figures do not represent total impacts within disturbance areas because we surveyed wider corridor widths and additional areas for contingency in the engineering design that ultimately will not be disturbed.

Figure 5 presents the additional disturbance areas for the temporary construction access road, transmission line corridor, utility corridor, road improvements to Black Rock Road, and additional project components that are outside the 2009 project footprint. Please note that some disturbance areas proposed in the 2009 project footprint have been removed in the 2010 project footprint. Therefore, the total Project Disturbance Area has been revised to be 6,983.9 acres. This total is still preliminary and subject to further refinement in the engineering design. A revised total disturbance area will be provided in final technical reports to be submitted to the CEC in early June.

AECOM

Figure 6 presents preliminary impacts to all cover types, including state waters, resulting from the revised Project Disturbance Area. These impact calculations are still preliminary and subject to further refinement in the engineering design. Revised impact calculations will be provided in final technical reports to be submitted to the CEC in early June.

Please let us know if you have any questions.

Sincerely,

Mr. William Graham
Principal
AECOM

Attachments:
Table 1. Blythe Solar Power Project Desert Tortoise Observations Spring 2010
Table 2. Blythe Solar Power Project Rare Plant Populations Counts Spring 2010
Table 3. Blythe Solar Power Project Incidental Wildlife Occurrences
Figure 1. Preliminary Results Desert Tortoise Spring 2010 Surveys
Figure 2. Preliminary Results Botany Rare Plants Spring 2010 Surveys
Figure 3. Preliminary Results State Waters Spring 2010 Surveys
Figure 4. Preliminary Results Incidental Wildlife Occurrences Spring 2010 Surveys
Figure 5. Preliminary Disturbance Areas May 2010
Figure 6. Preliminary Impacts to Cover Types May 2010
CD. Raw Data Files in Excel and Shapefiles

cc:
Alice Harron, Solar Millennium
Elizabeth Ingram, Solar Millennium
Scott Galati, Solar Millennium Counsel
Mark Luttrell, AECOM

AECOM

Table 1. Blythe Solar Power Project Desert Tortoise Observations Spring 2010

Description	Proposed Project Study Area	Reconfigured Alternative Project Study Area	Proposed Project/Reconfigured Alternative Study Area[1]	Buffer	Incidental Observations Outside Buffer Area	Grand Total
Adult Tortoise		1		2		3
Adult Tortoise - Second Observation		1				1
Active Tortoise Burrow or Pallet - Class 1		3	1	22	4	30
Tortoise Burrow or Pallet - Class 2 (good condition, no evidence of recent use)	2	4		20	1	27
Tortoise Burrow or Pallet - Class 3 (deteriorated, definitely tortoise)		5		5	3	13
Possible Tortoise Burrow or Pallet (Class 4 or 5)		13		50	9	72
Tortoise Scat		2		2	1	5
Fossilized Turtle/Tortoise Bone		1		1		2
Tortoise Bone Fragment - Mineralized	10	10		6		26
Tortoise Bone Fragment - Not Mineralized	20	22	3	17	2	64
Tortoise Carcass (not disarticulated and scattered)	1	4		5		10
Tortoise Egg Shell Fragment		3				3
Tortoise Tracks	1	3	2	1		7
Tortoise Drinking Depression		1				1

[1]This encompasses the areas where the Proposed Project Study Area and Reconfigured Alternative Study Area overlap.

AECOM

Table 2. Blythe Solar Power Project Rare Plant Population Counts Spring 2010[1]

Species	Proposed Project Study Area	Reconfigured Alternative Project Study Area	Propose Project/Reconfigured Alternative Study Area[2]	Buffer	Incidental Observations Outside Buffer Area	Grand Total
Cottontop cactus	1		5	10		16
Harwood's milkvetch	677	60	128	1,837	60	2,762
Harwood's woollystar	2,134			1,287	8	3,429
Desert unicorn	4	15	6	1		26
Ribbed cryptantha	32,367			37,377	1,909	71,653[3]
Utah milkvine	14	78	12	526		630
Winged cryptantha				15		15

[1] Note that each point on the figure may represent multiple individuals

[2] This encompasses the areas where the Proposed Project Study Area and Reconfigured Alternative Study Area overlap.

[3] Ribbed cryptantha was observed during 2010 botanical surveys as a generally continuous population throughout the stabilized and partially stabilized desert dunes south of I-10. This number represents the total number of plants physically counted during subsampling efforts; the actual population is currently estimated in the tens of millions (a more accurate population estimate will be provided in the Botanical Survey Report).

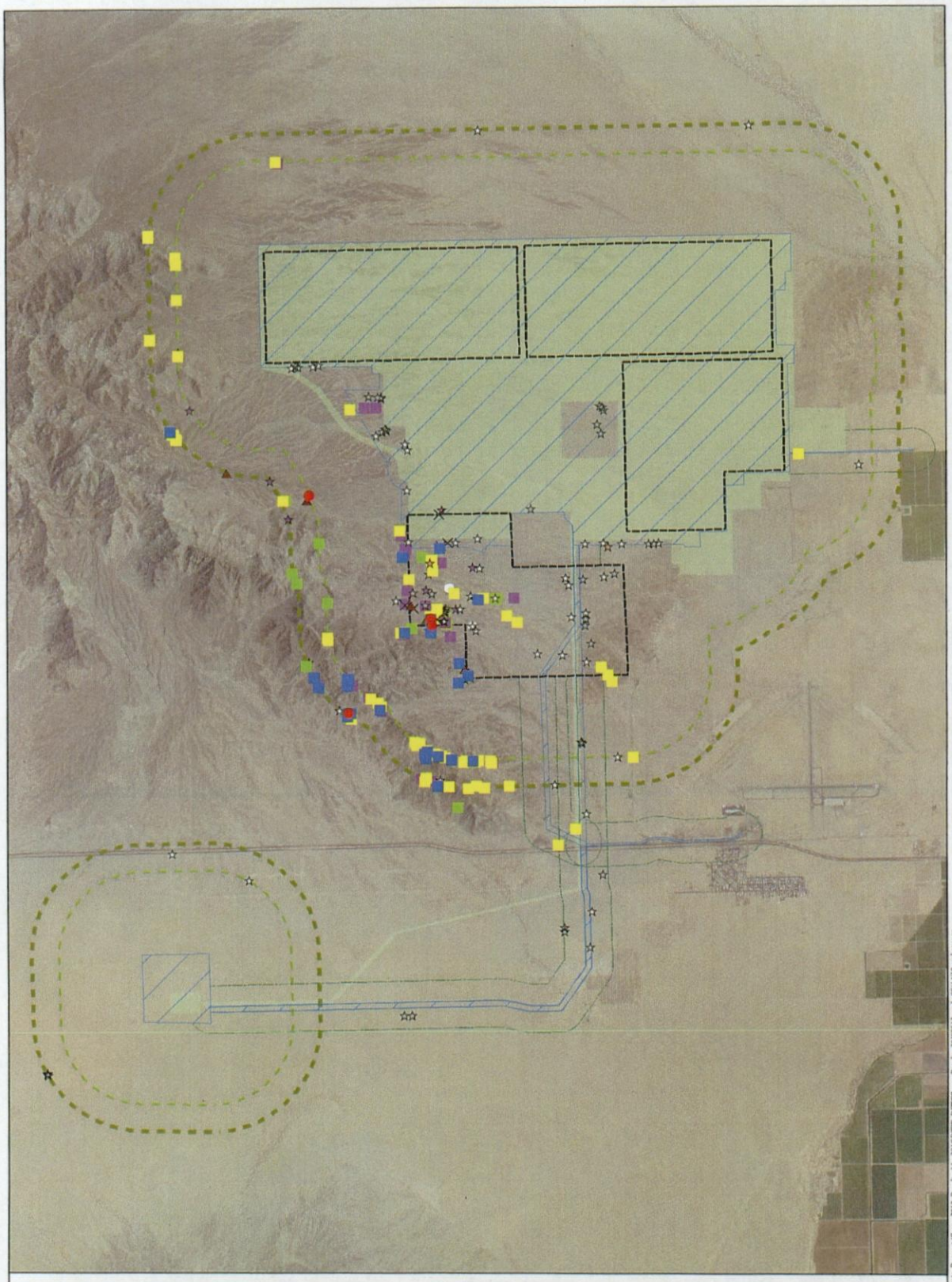
AECOM

Table 3. Blythe Solar Power Project Incidental Wildlife Occurrences Spring 2010[1]

Species Observations or Sign	Project Study Area	Reconfigured Alternative Study Area[2]	Buffer	Grand Total
American Badger Den	2	6		8
American Badger Predation Burrow		1	1	2
Bat Guano - Unknown Species		1		1
Cooper's Hawk			1	1
Ferruginous Hawk			1	1
Kit Fox Burrow	6	6	2	14
Kit Fox Complex	5	10	7	22
Loggerhead Shrike	2	2	6	10
Loggerhead Shrike Nest			1	1
Mojave Fringe-toed Lizard	86		48	134
Nest Cavity - Unidentified Woodpecker Species			1	1
Northern Harrier	1	1	1	3
Potential Pond for Couch's Spadefoot	3	2	9	14
Swainson's Hawk	4		5	9
Unknown Raptor Nest			1	1
Western Burrowing Owl	1	1	1	3

[1] These observations were noted during protocol surveys conducted for desert tortoise, rare plants, western burrowing owl, jurisdictional waters and vegetation mapping.

[2] This encompasses the areas where the Proposed Project Study Area and Reconfigured Alternative Study Area overlap.



DT Observations (Spring 2010)

- Adult Tortoise
- Adult Tortoise - Second Observation
- Active Tortoise Burrow or Pallet - Class 1
- Tortoise Scat
- Tortoise Tracks
- Fossilized Turtle/Tortoise Bone
- Possible Tortoise Burrow or Pallet (Class 4 or 5)
- Tortoise Bone Fragment - Mineralized
- Tortoise Bone Fragment - Not Mineralized
- Tortoise Burrow or Pallet - Class 2 (good condition, no evidence of recent use)
- Tortoise Burrow or Pallet - Class 3 (deteriorated, definitely tortoise)
- Tortoise Carcass (not disarticulated and scattered)
- Tortoise Drinking Depression
- Tortoise Egg Shell Fragment

Map Location

Legend

- Project Study Area
- Reconfigured Alternative Study Area
- Study Area (Surveyed in 2009)
- Buffer Transect 1000-foot
- Buffer Transect 3/4-mile
- Buffer Transect 1-mile

0 4,500 9,000 Feet

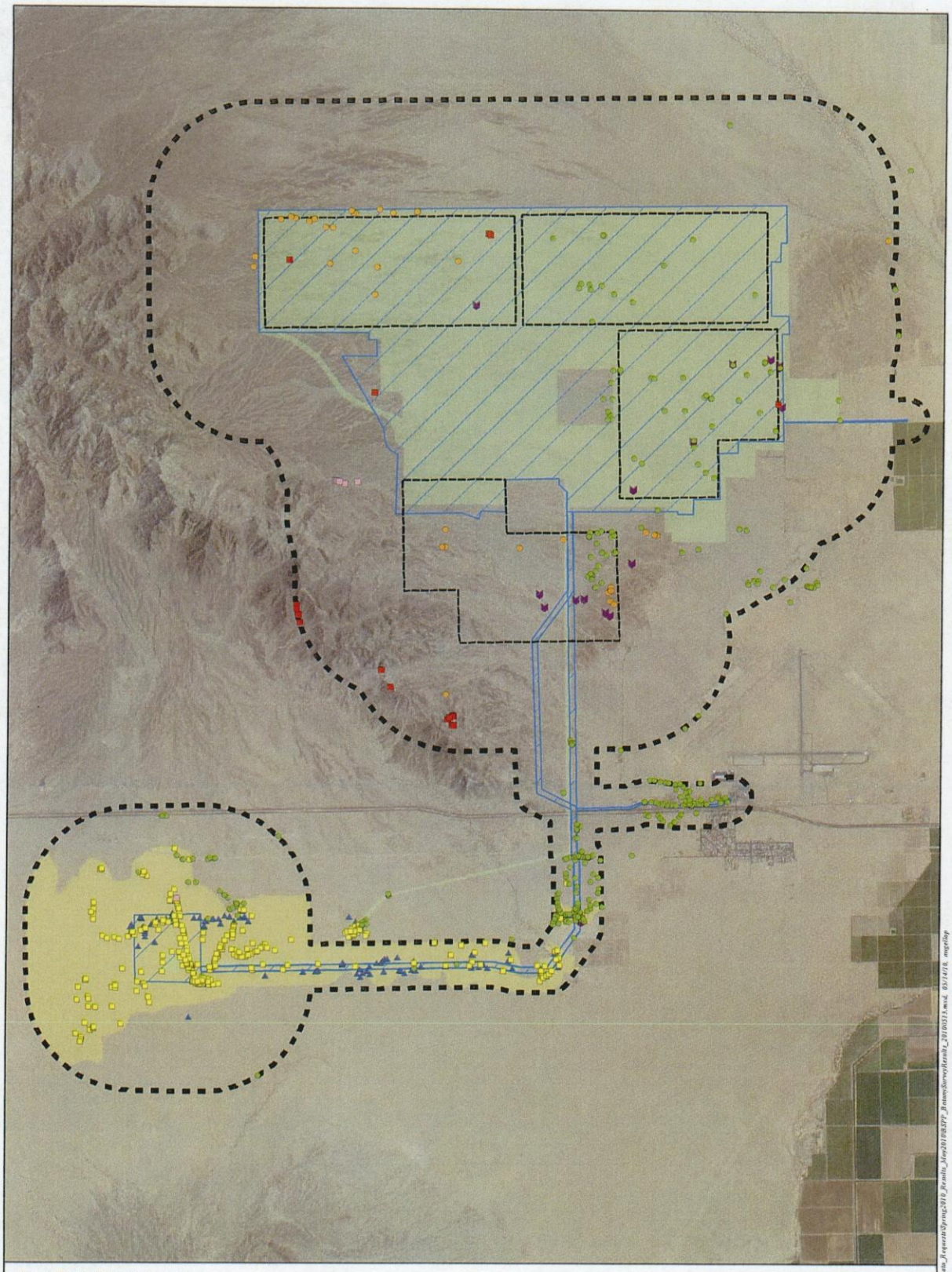
Blythe Solar Power Project
Figure 1
Preliminary Results
Desert Tortoise
Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010



Rare Plant Observations

- Winged cryptantha
- Cottontop cactus
- Desert unicorn
- Utah milkvine
- Harwood's woollystar
- Harwood's milkvetch
- Ribbed cryptantha
- Ribbed cryptantha occupied habitat

Map Location

Legend

- Reconfigured Alternative Study Area
- BRSA
- Project Study Area
- Study Area (Surveyed in 2009)

0 4,500 9,000 Feet

Blythe Solar Power Project

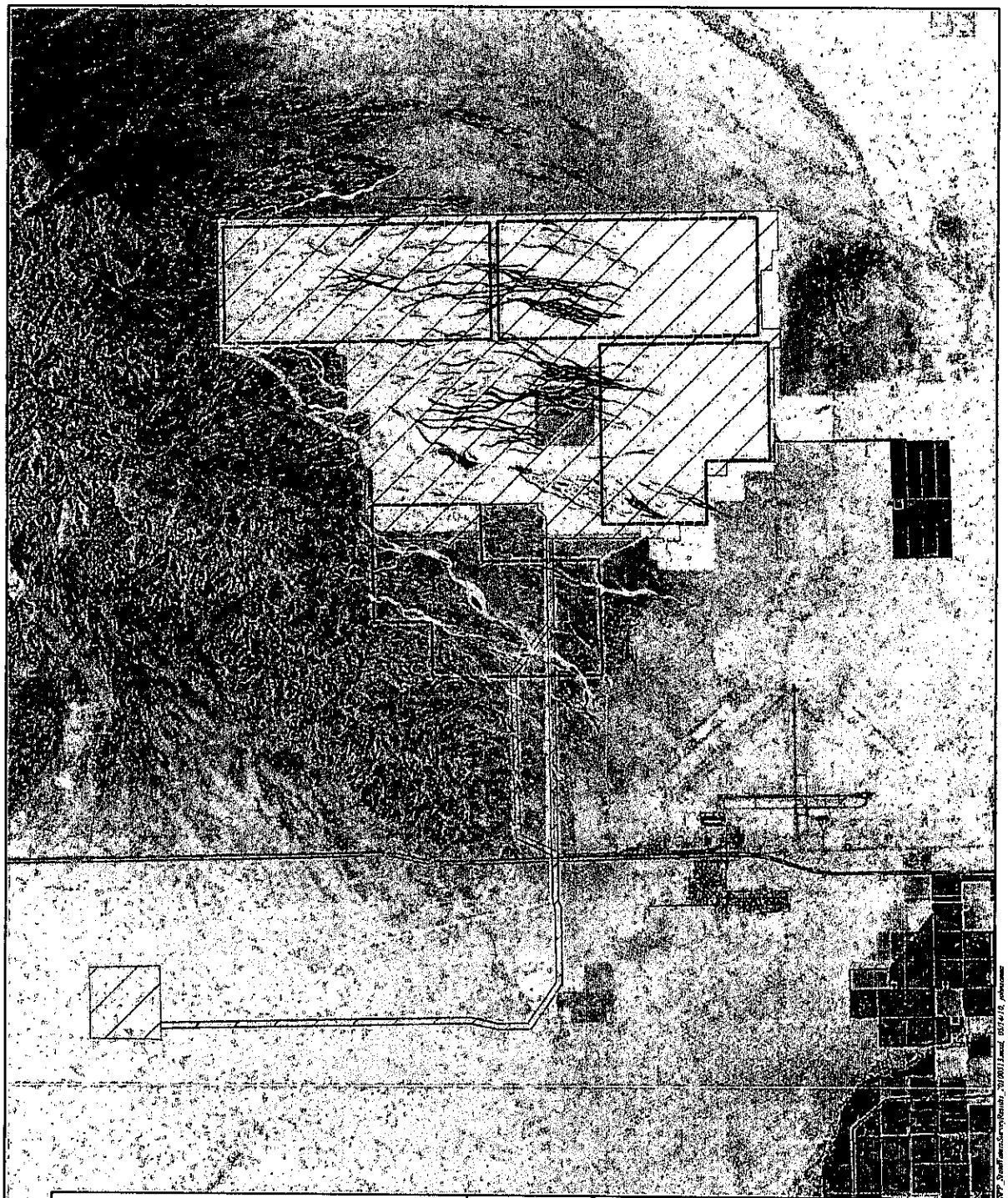
Figure 2
Preliminary Results
Botany Rare Plants
Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010



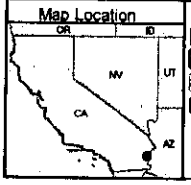
Jurisdictional Waters of the State		Project Study Area	Buffer	Reconfigured Alternative Study Area*	Buffer
Desert Dry Wash Woodland	Wash Dependant Vegetation	8.4	0.2	0.7	0.4
	Riparian Interfluve	23.8	0.0	3.5	
	Vegetated Ephemeral Dry Wash	279.9	36.8	143.8	27.7
Other Waters	Unvegetated Ephemeral Dry Wash	9.2	1.5	5.0	1.5
	Swale	416.8	6.5	235.9	21.6

Jurisdictional Waters of the State of California

Desert Dry Wash Woodland
- Wash Dependent Vegetation
- Riparian Interfluve
- Vegetated Ephemeral Dry Wash

Other Waters
- Swale
- Unvegetated Ephemeral Dry Wash
- Study Area (Surveyed in 2009)

Map Location



Legend
- Project Study Area
- Reconfigured Alternative Boundary*
- 250-foot Buffer Study Area
- Study Area (Surveyed in 2009)

0 4,500 9,000 Feet

*Note: The Reconfigured Alternative Disturbance Area encompasses the disturbance caused by construction of the solar power blocks only and is not a complete engineering design.

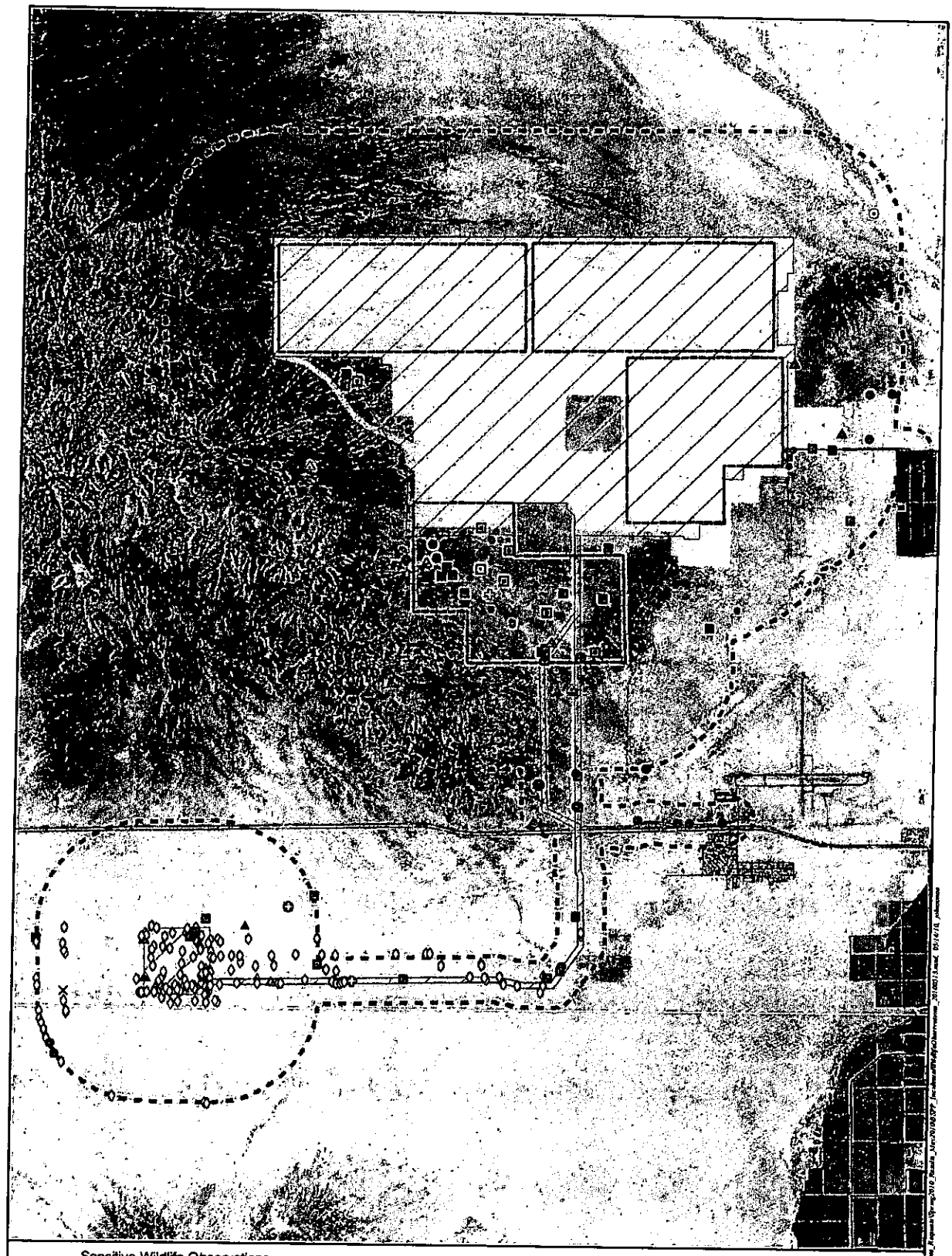
Blythe Solar Power Project
Figure 3
Preliminary Results
State Waters
Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

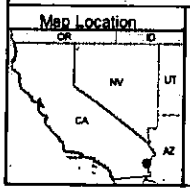
Date: May 2010



Sensitive Wildlife Observations

- American Badger Den
- American Badger Predation Burrow
- Bat Guano - Unknown Species
- Cooper's Hawk
- Ferruginous Hawk
- Kit Fox Burrow
- Kit Fox Complex
- Loggerhead Shrike
- Loggerhead Shrike Nest
- Mojave Fringe-toed Lizard
- Potential Pond for Couch's Spadefoot
- Nest Cavity - Unidentified Woodpecker Species
- Western Burrowing Owl
- Unknown Raptor Nest
- Northern Harrier
- Swainson's Hawk

Map Location



Legend

- Project Study Area
- Reconfigured Alternative Study Area
- Study Area (Surveyed in 2009)
- BRSA

0 4,500 9,000 Feet

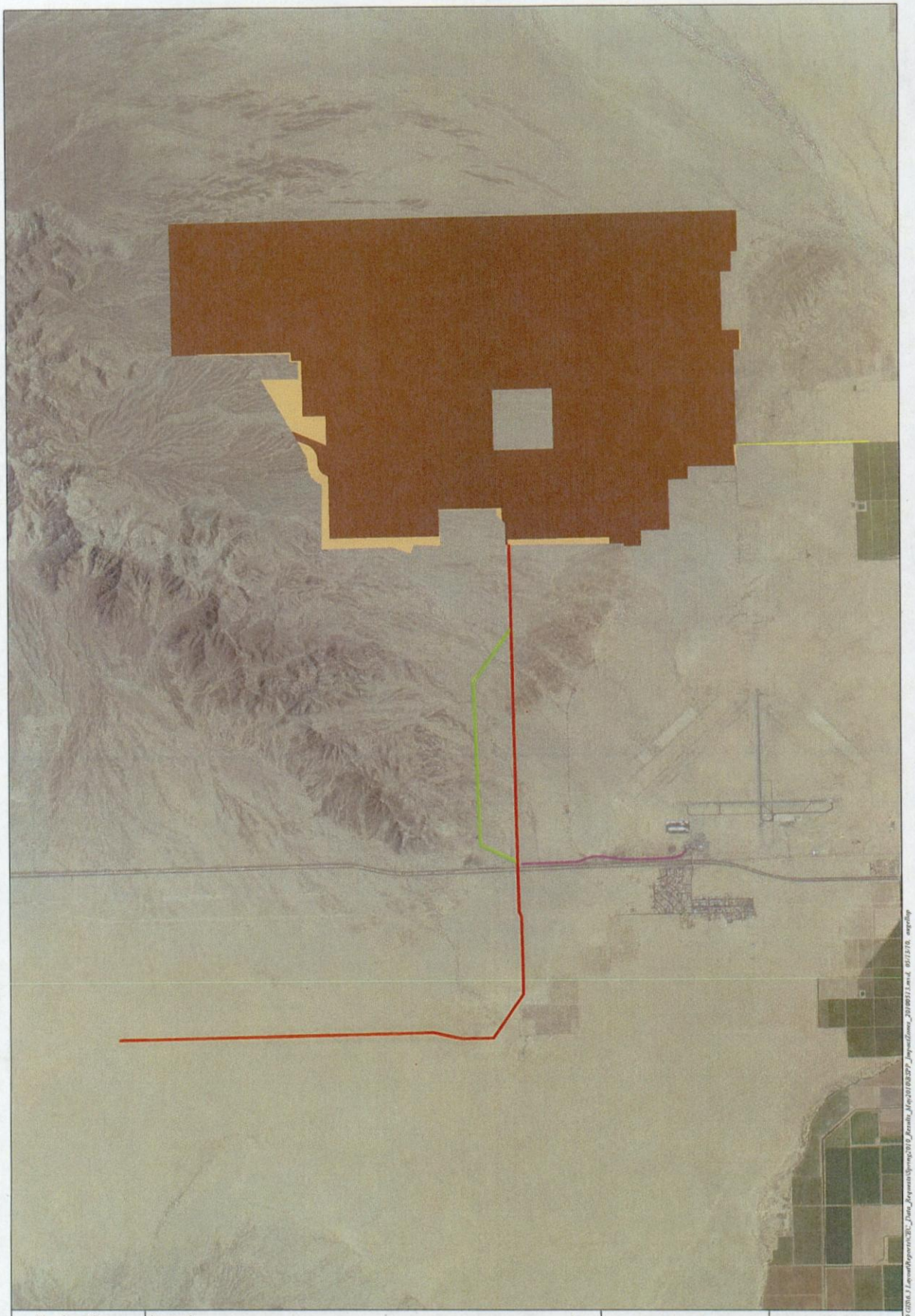
Blythe Solar Power Project
Figure 4
Incidental Wildlife Observations
Spring 2010 Surveys

Source: NAIP 2009; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010



Map Location

Legend

Impact Boundaries

- Disturbance Area (6,603.4 acres)
- Additional Disturbance Areas 2010 (236.5 acres)
- Gen-Tie Alignment Disturbance Area (33.2 acres)
- Temporary Construction Power Disturbance Area (2.7 acres)
- Utility Corridor Disturbance Area (90.8 acres)
- Black Rock Road Access Disturbance Area (17.3 acres)

0 4,000 8,000 Feet

Blythe Solar Power Project Spring 2010 Surveys

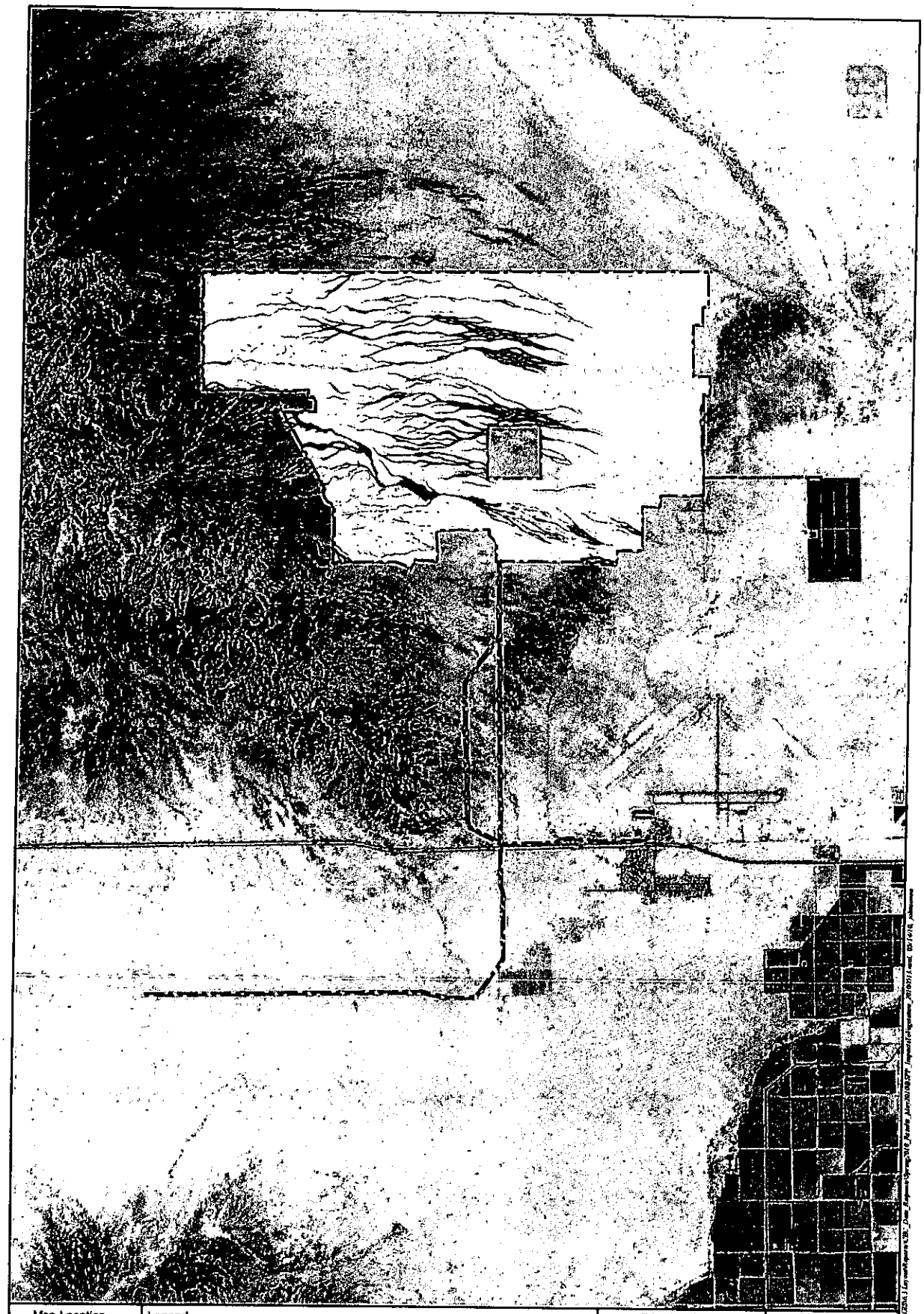
Figure 5 Preliminary Disturbance Areas

Source: NAIP 2009; AECOM 2010

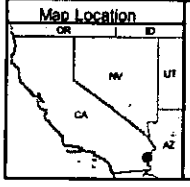
1 inch = 4,000 feet

AECOM

Date: May 2010



Map Location



Legend

Vegetation Community Impacts

Riparian

- Desert Dry Wash Woodland (202.2 acres)
- Unvegetated Ephemeral Dry Wash (8.6 acres)

Upland

- Big Galleta Grass - Creosote Bush Scrub Association (370.0 acres)
- Sonoran Creosote Bush Scrub (5,342.8 acres)
- Stabilized and Partially Stabilized Desert Dunes (40.84 acres)

Other

- Agriculture: Active and Fallow (2.2 acres)
- Developed (0.3 acre)
- Preliminary Disturbance Areas May 2010

0 4,500 9,000 Feet

Blythe Solar Power Project Spring 2010 Surveys

Figure 6 Preliminary Impacts to Cover Types May 2010

Source: NAIP 2008; AECOM 2010

1 inch = 4,500 feet

AECOM

Date: May 2010

EXHIBIT 315

The California ENERGY COMMISSION

Home » dockets » **docket redesign**

Solar Millenium Blythe Power Plant Project

Docket Number 09-AFC-06

PLEASE NOTE: This Docket Log is only a **listing** of all the documents filed in a proceeding. It was not set up to have links to all documents filed in a proceeding. Not all documents are available on line. The major documents for this proceeding are on the "documents page." Please click on the link to the documents page from the proceeding's main page.

If you would like copies of a document listed on this docket log, please contact:

Dockets Unit
916-654-5076
E-mail: DOCKET@energy.state.ca.us

Each docket log is updated Friday, but only if items have been added that week.

Log #	Dated	To	From	Subject	Pages
56910	05 / 27 / 2010	Mojave Desert Air Quality Management District	CEC / M. Layton	Leter to Mojave Desert AQMD re Comments on Preliminary Determination of Compliance	2
56971	05 / 25 / 2010	CEC / A. Solomon	Mojave Desert Air Quality Mgmt. District / E. Heasto	Revised Preliminary Decision & Determination of Compliance	38
56845	05 / 25 / 2010	CEC / Docket Unit	Galati Blek / M. Mills	Applicant's Objections & Notice of Inability to Respond to CURE's Data Requests	8
56855	05 / 21 / 2010	CEC / Docket Unit	CEC / M. Read	Notice & Orders for Consolidated Hearing on Issues Concerning US BLM - Cultural Resources Data	18
56798	05 / 21 / 2010	CEC / A. Solomon	Soalr Millenium / A. Harron	Responses to CEC Workshop Questions - Worker Safety, Hazardous Materials, Soil & Water	17
56797	05 / 20 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Revised Health Risk Assessment - Technical Area, Air Quality	11
56720	05 / 18 / 2010	CEC / Docket Unit	CEC / J. Preis	Staff Letter to CURE	5
56753	05 / 17 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Southern CA Edison Colorado River Substation Project Description	310
56736	05 / 17 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Assessment of Impacts from a Revision in Well Configuration for Proposed Water Supply	14
56717	05 / 17 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Application - Report of Waste Discharge - Proposed Evaporation Ponds	753
56822	05 / 14 / 2010	CEC / A. Solomon	Soalr Millenium / A. Harron	Responses to CEC Workshop Questions - Biological Resources	14
56749	05 / 14 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / T. Gulesserian	CURE Data Requests Set One	56
56735	05 / 14 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Responses to April & May Workshops, HTF Fluid Discussion	4
56733	05 / 14 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Responses to April & May Workshops, Operation Phase Fire Protection	6
56699	05 / 14 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Responses to Questions from CEC Workshops - Worker Safety & Hazardous Materials	14
56697	05 / 13 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Response to April 2010 Workshop Questions - Worker Safety, Hazardous Materials & Water Resources	8

56668	05 / 13 / 2010	CEC / Docket Unit / A. Solomon	Defenders of Wildlife / J. Aardahl	Comments on Staff Assessment / Draft Environmental Impact	2
56624	05 / 11 / 2010	Solar Millenium / A. Harron	CEC / C. Chainey-Davis	Email from CEC to Solar Millenium Requesting Additional Info.	2
56623	05 / 10 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Draft Summary - 2010 Spring Survey Results	9
56614	05 / 10 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / C. Horton	CURE's Letter re May 2010 Workshop	7
56602	05 / 07 / 2010	CEC / Docket Unit	Peter Murray & Associates / K. B. Waxlax	Comment Letter re Real Estate from Peter Murray & Associates	3
56544	05 / 04 / 2010	CEC / A. Solomon	Defenders of Wildlife / A. Solomon	Comment Letter from the Defenders of Wildlife	4
56509	05 / 03 / 2010	CEC / Docket Unit	CEC / A. Solomon	Notice Staff Workshop Continuation	1
56637	04 / 30 / 2010	CEC / R. Renaud	Adams, Broadwell, Joseph & Cardozo / E. Klebaner	Request for Update of POS List for Intervenors CURE	2
56493	04 / 30 / 2010	CEC / Docket Unit	CEC / M. Read	Notice of Prehearing Conference & Evidentiary Hearing	9
56469	04 / 29 / 2010	CEC / Docket Unit	CEC / H. Anderson	Comments on the Draft Desert Tortoise Translocation Plans.	5
56554	04 / 26 / 2010	CEC / A. Solomon	Dept. of Transportation / D. Kopulsky	Comment Letter from the CA Department of Transportation	3
56387	04 / 22 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Solar Millenium's Spring Survey Protocols, Biological Resources	34
56553	04 / 21 / 2010	CEC / A. Solomon	County of Riverside DEH / M. Mistica	Comment Letter from Riverside County Dept. of Environmental Health	2
56302	04 / 19 / 2010	CEC / Docket Unit	Galati Blek / M. Mills	Palo Verde Solar 1's Initial Comments on the SA, DEIS	174
56253	04 / 15 / 2010	CEC / Docket Unit	CEC / M. Read	Notice of Opportunity to File Statements of Concern Regarding E. Allen Serving as a Commissioner Advisor	7
56240	04 / 14 / 2010	CEC / Docket Unit	CEC / C. Hong	Energy Commission Staff's Issues Statement	3
56218	04 / 12 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / E. Klebaner	California Unions for Reliable Energy Issues Statement One	6
56209	04 / 12 / 2010	CEC / Docket Unit	Galati Blek / M. Mills	Palo Verde Solar I's Issues Statement for April 2010 Status Conference	6
56122	04 / 05 / 2010	CEC / Docket Unit	CEC / K. Douglas, R. Weisenmiller	Notice of Mandatory Status Confrence	4
56097	04 / 02 / 2010	CEC / A. Solomon	Bureau of Land Management / M. Harper	Comments from M. Harper	1
56020	03 / 23 / 2010	CEC / Docket Unit	CEC / T. O'Brien	Notice of Avaliability and Notice of a Public Workshop	8
56018	03 / 23 / 2010	Agency Distribution	CEC / T. O'Brien	Agency Letter	7
56017	03 / 23 / 2010	CEC / Docket Unit	CEC / T. O'Brien	Library Letters	8
56099	03 / 22 / 2010	CEC / A. Solomon	CRB / G. Zimmerman	Letter from the Colorado River Board of California	5
56094	03 / 22 / 2010	CEC / A. Solomon	Colorado River Board / G. Zimmerman	Letter from the Colorado River Board of California	5
56092	03 / 22 / 2010	CEC / Docket Unit	RCALUC / E.Cooper	Letter from Riverside County Airport Land Use Commission	2
55746	03 / 22 / 2010	CEC / Docket Unit	CEC / A. Valos	Notice of Mandatory Status Conference	4
55931	03 / 16 / 2010	CEC / Docket Unit	CEC / M. Read	Committee Order Adopting Filing & Electronic Documents Directives	4
55865	03 / 11 / 2010	CEC / E. Solomon	Solar Millennium / A. Harron	Applicant's Responses to January 2010 CEC Workshop Queries	49

55817	03 / 09 / 2010	CEC / Docket Unit	CEC / R. Avalos	Notice of Postponement of Mandatory Status Conference	4
55806	03 / 08 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Draft Biological Assessment	77
55782	03 / 08 / 2010	Public / A. De Salvio	CEC / M. Layton	Comments on Preliminary Determination of Comliance (PDOC)	2
55787	03 / 04 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / B. Heeley	CURE's Comments on the Preliminary Determination of Compliance	22
55945	03 / 03 / 2010	Galati Blek / D. Wiseman	CEC / M. Jones	CEC Response to Applications for Confidentiality Cultural Resources Data Requests 122, 128 to 133 & 146 to 148	2
55887	03 / 03 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Riverside County Airport Land Use COmmission Application for Major Land Use Action Review	28
55767	03 / 03 / 2010	CEC / A. Solomon	Solar Millennium / A. Harron	Applicant's Comments on Preliminary Decision / Determination of Compliance	14
55748	03 / 03 / 2010	All Parties	CEC / R. Avalos	All Parties Letter Regarding Newly Revised POS	4
55769	03 / 01 / 2010	CEC / D. Flores	Riverside County Airport Land Use Commission / E. Co	Letter From Riverside Count Airport Land Use Commission	2
55709	02 / 26 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / B. Heeley	Letter to Eldon Heaston Regarding Preliminary Determination of Compliance of Project	5
55639	02 / 24 / 2010	CEC / Docket Unit	CEC / James Davis	Community Based Out Reach List	7
55528	02 / 22 / 2010	CEC / M. Layton	Mojave Desert Air Quality Mgmt. District / A. Salvio	Comments on PDOC	4
55745	02 / 19 / 2010	Solar Millenium	Public / Lin Porter	Letter from L. Porter Regarding His Property	8
55457	02 / 16 / 2010	CEC / A. Solomon	County of Riverside / J. Jolliffe	Letter from Riverside County Planning Department	5
55626	02 / 11 / 2010	Solar Millenium / A. Harron	CEC / A. Solomon	Email to Alice Harron Regarding Application Submittal to ALUC	1
55379	02 / 11 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Responses to January CEC Workshop Queries	20
55325	02 / 10 / 2010	CEC / Docket Unit	Adams, Broadwell, Joseph & Cardozo / B. Heeley	California Unions for Reliable Energy Status Report Number One	5
55267	02 / 09 / 2010	CEC / Docket Unit	CEC / R. Avalos	Committee Scheduling Order	6
55300	02 / 08 / 2010	CEC / M. Jones	Galati Blek / M. Mills	Repeated Application for Confidential Cultural Class III Survey Draft Report	2000
55274	02 / 08 / 2010	CEC / A. Solomon	Solar Millennium. Alice Harron	Responses to January 14, 2009 CEC Workshop Queries Technical Area Air Quality	35
55448	02 / 06 / 2010	CEC / A. Solomon	Riverside County Fire Department / J. Neuman	Letter from Riverside County Fire Department	2
55324	02 / 05 / 2010	CEC / A. Solomon	CEC / A. Harron	Responses to January CEC Email Queries	6
55212	02 / 04 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Response to January Email Query	77
55459	02 / 03 / 2010	CEC / Docket Unit	Galati Blek / M. Mills	Applicant's Cultural Resources Alternatives Assessment	37
55349	02 / 03 / 2010	CEC / M. Jones	Galati Blek / R. Gladden	Repeated Application for Confidential Cultural Resources & Alternative Assessment - CHRIS Information	2000
55213	02 / 03 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Responses to CEC E-mail Query from CEC Staff, Additional Info	25
55130	01 / 29 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Data Responses to CEC Queries & Attachment DR-CR-120a & b	23
55128	01 / 29 / 2010	CEC / A. Solomon	Solar Millenium / A. Harron	Applicant's Data Response to DR-BIO-58	27
55161	01 / 28 / 2010	CEC / M. Jones	Galati Blek / M. Mills	Application for Confidential Designation - Revised Department of Parks & Recreation Archaeological Site Records	1097
55112	01 / 28 / 2010	CEC / Docket Unit	CEC / A. Solomon	ROC Between S. Sanders & J. Mace (ACE) Regarding Status of Jurisdictional Determination	1
55101	01 / 28 / 2010	CEC / M. Jones	Galati Blek / M. Mills	Application for Confidential Designation - Traditional Use Areas, Response to Data Requests 146-148	17

55086	01 / 28 / 2010	Solar Millennnium / J. Eichhmmer	Mojave Air Quality Management District / A. De Salv	Mojave Desert Air Quality Management District(AQMD) Preliminary Determination of Compliance	62
55650	01 / 27 / 2010	CEC / Docket unit	CEC / J. Leyva	Heat Transfer Fluid Emissions Conference Call Record of Conversation	2
55025	01 / 26 / 2010	CEC / Docket Unit	CEC / R. Avalos	Memo Regarding Newly Revised Proof of Service List	4
55143	01 / 25 / 2010	CEC / Docket Unit	CEC / J.Kessler	Informational Hearing, Scoping Meeting, & Site Visit Presentation	59
55038	01 / 22 / 2010	CEC / A. Solomon	Solar Millennium / A. Harron	Applicant's Supplemental Responses to CEC Data Request Set 1	94
54989	01 / 22 / 2010	CEC / Docket Unit	Galati Blek LLP / M. Mills	Applicant's Proposed Schedule	5
55627	01 / 20 / 2010	CEC / J. Adams	Public Works / J. Rodkey	Email to Jim Adams Regarding RC Airport Land Use Commission	2
54900	01 / 20 / 2010	CEC / Docket Unit	CEC / J. Adams	E-mail from the City of Blythe Department of Public Works	2
54932	01 / 19 / 2010	CEC / A. Solomon	Airport Land Use Commission / J. Guenn	Riverside Country Airport Land Use Commission	3
54871	01 / 18 / 2010	CEC / Docket Unit	AECOM / C. Lindner	Attachment G WSA	30
54886	01 / 13 / 2010	CEC / Docket Unit	CEC / R. Avalos	Revised Agenda Regarding California Energy Commission Informational Hearings	3
54819	01 / 13 / 2010	CEC / Docket Unit	CEC	Revised Agenda for Informational Hearings	3
54815	01 / 13 / 2010	CEC / Docket Unit	Galati Blek / A. Garner	Application for the California Endangered Species Act Incidental Take Permit and Revised Desert Tortoise Technical Report	141
54757	01 / 11 / 2010	CEC / Dokcet Unit	CEC / A. Soloman	Notice of Data Requests Staff Woekshop Continuation	1
54750	01 / 11 / 2010	CEC / Docket Unit	CEC / K. Douglas & J. Byron	Notice of Informational Hearing & Public Site Visit	11
54903	01 / 08 / 2010	CEC / M. Jones	G&B / R. Gladden	Repeated Application for Confidential Designation - Attachments 2, 3, 4, 5, & 6 to the Cultural Class III Survey Draft Report, Archaeological Survey of Geothermal Drilling, Environmental Impact Evaluation, and Draft Geoarchaeological Monitoring Report	2000
54726	01 / 08 / 2010	CEC / Docket Unit	Galati Blek LLP / A. Garner	Cultural Resources Class III Survey Draft Report	383
54785	01 / 07 / 2010	CEC / A. Solomon	Riverside County Fire Department / J. Neuman	Riverside County Fire Department, Responses to Survey Questions	4
54952	12 / 29 / 2009	CEC / A. Solomon	Public / L. Porter	Letter From Lin Porter Concerning His Property	3
54593	12 / 28 / 2009	All Parties	CEC / R. Avalos	All Parties Letter Regarding Newly Revised Proof of Service	4
54956	12 / 23 / 2009	CEC / A. Solomon	Center For Biological Diversity / I. Anderson	Scoping Comments From The Center For Biological Diversity	23
54790	12 / 23 / 2009	CEC / A. Solomon	Wilderness Society / A. Bond	Scoping Comments from the Wilderness Society & Natural Resources Defense Council	22
54789	12 / 23 / 2009	CEC / A. Solomon	California & Nevada Desert Energy Committee / J. Ta	Scoping Comments from CNRCC Desert Committee	206
54782	12 / 23 / 2009	CEC / A. Solomon	Defenders of Wildlife / J. Aardahl	Scoping Comments from Defenders of Wildlife	10
54781	12 / 23 / 2009	CEC / A. Solomon	Western Watersheds Project / M. Connor	Scoping Comments From Western Watershed Project	7
54577	12 / 23 / 2009	CEC / Docket Unit	CEC / K. Douglas / J. Byron	Committee Order Granting California Unions for Reliable Energy's Petition to Intervene	4
54949	12 / 22 / 2009	CEC / A. Solomon	Off Road Business Association / M. Grossglass	Scoping Comment From ORBA	3
54537	12 / 22 / 2009	CEC / Docket Unit	Galati Blek / A. Garner	Selection of Cultural Resources Evaluation Approach	5

54527	12 / 21 / 2009	Bureau of Land Management / Holly Roberts	Boulder Canyon Operation Office / S. Hvinden	Letter from Bureau of Reclamation	3
54496	12 / 21 / 2009	CEC / Docket Unit	CEC / E. Allen	Library Letter	5
54495	12 / 21 / 2009	CEC / Docket Unit	CEC / E. Allen	Notice of Receipt	5
54494	12 / 21 / 2009	CEC / Agency Distribution List	CEC / E. Allen	Request for Agency Participation	6
54473	12 / 17 / 2009	CEC / K. Douglas / J. Byron	CEC / A. Solomon	Issues Identification Report	12
54555	12 / 16 / 2009	Galati Blek / David Wiseman	CEC / M. Jones	Energy Commission's Letter in Response to Application for Confidential Designation Regarding Fossil Occurrence Points	2
54444	12 / 15 / 2009	Al Parties	CEC / M. Read	All Parties Letter Newly Revised Proof of Service List	4
54432	12 / 11 / 2009	CEC / A. Solomon	USEPA / A. McPherson	Letter from EPA RE Notice of Intent to Prepare Environmental Impact Statement for the Proposed Chevron Energy Solutions	14
54406	12 / 09 / 2009	CEC / Docket Unit	Adams Broadwell Joseph & Cardozo / C. Horton	Petition to Intervene by California Union for Reliable Energy	7
54348	12 / 07 / 2009	Solar Millennium / G. Berg	CEC / A. Solomon	Data Requests, Set 1 (# 1-260)	120
54341	12 / 01 / 2009	CEC / A. Solomon	DTSC / G. Holmes	Letter from Department of Toxic Substances Control	4
54296	12 / 01 / 2009	Solar Millennium / G. Berg	CEC / A. Solomon	New Alternative Approach to Staff Review fro Cultural Resources	4
54292	11 / 30 / 2009	CEC / Docket Unit	Galati & Blek LLP / M. Mills	Pre-Development Drainage Conditions Report	33
54258	11 / 25 / 2009	CEC / Docket Unit	Galati & Blek LLP / M. Mills	Streamed Alteration Agreement Application	1772
54300	11 / 24 / 2009	CEC / A. Solomon	US Dept of Interior / D. Briery	Bureau of Land Management News Release Seeking Public Input	1
54301	11 / 23 / 2009	CEC / A. Solomon	US Dept of the Interior	BLM Notice of Intent to Prepare Two Environmental Impact Statements	3
54197	11 / 20 / 2009	CEC / D. Dyer	Galati Blek / S. Galati	E-mail Withdrawing Confidential Information - Phase I Transmission Studies	1
54184	11 / 18 / 2009	All Commissioners	CEC / K. Douglas	Hearing Officer Assignment	1
54201	11 / 16 / 2009	CEC / M. Jones	Galati Blek / D. Wiseman	Application for Confidential Designation - Fossil Occurence Points	5
54062	11 / 12 / 2009	CEC / Docket Unit	CEC / M. Jones	Revised Data Adequacy Recommendation	72
54007	10 / 26 / 2009	CEC / M. Jones	Solar Millenium	Data Adequacy Supplement	926
53841	10 / 26 / 2009	CEC / M. Jones	Paul Hastings / M. Sanders	Repeat Application for Confidential Designation - Cultural & Paleontological Resources	2000
53821	10 / 26 / 2009	Paul Hastings / M. Sanders	CEC / M. Jones	Energy Commission's Response to Application for Confidential Designation Regarding Cultural Resources Technical Report	2
53804	10 / 21 / 2009	CEC / M. Jones	Assembly California Legislature / V. Manuel Perez	Letter from Assembly Person V. Manuel Perez	1
53703	10 / 01 / 2009	CEC / M. Jones	Paul Hastings / M. Sanders	Application for Confidential Designation - Additional Information for Transition Cluster Study	1
53548	10 / 01 / 2009	CEC / Docket Unit	CEC / E. Allen	Document Handling for and Public Participation in the Review of the Appplication for Certification	3
53547	10 / 01 / 2009	CEC / Docket Unit	CEC / E. Allen	Notice of REceipt of an AFC	3
53546	10 / 01 / 2009	Agency Distribution List	CEC / E. Allen	Request for Agency Participation	3
53586	09 / 29 / 2009	CEC / M. Jones	Paul Hastings / M. Sanders	Application for Confidential Designation - Paleontological Resources Tech Report	11
53505	09 / 24 / 2009	CEC / M. Jones	Paul Hastings / J. Eichhammer / R. Redlinger	Application for Confidential Designation - Cultural Resources Technical Report Attachments	2000
53370	09 / 23 / 2009	Commissioners	CEC / M. Jones	Data Adequacy Recommendation	97
53076	08 / 28 / 2009	CEC / Docket Unit	AECOM Enviornment	Air Quality Modeling Files	1
53119	08 / 26 / 2009	CEC / M. Jones	Paul Hastings / M. Sanders	Application for Confidential Designation -Transitiion Cluster Phase I Study	13
52937	08 / 24 / 2009	CEC / M. Jones	Solar Millennium / J. Eichhammer	Application for Certification Vol 1 & 2	2000

56936	/ /	CEC / Docket Unit	CEC / A. Solomon	Renewable Energy Development & Common Raven Predation on Desert Tortoise SUMMARY	3
56626	/ /	CEC / Docket Unit	County of Riverside Airport Land Use Commission	County of Riverside Airport Land Use Commission May 2010 Staff Report	293
55836	/ /	CEC / Docket Unit	CEC / A. Solomon	Staff Assessment / Draft Environmental Impact Statement	1327
55832	/ /	CEC / A. Solomon	Lin Porter	Lin Porter's Letter Regarding His Property	9
55037	/ /	CEC / Docket Unit	Palo Verde Solar I	Applicants Responses to CEC Data Requests Set 1	2000
54559	/ /	CEC / Docket Unit	CEC / T. O'Brien	Data Response Workshop Notice	5
54264	/ /	CEC / Docket Unit	CEC / T. O'Brien	Data Request Workshop Notice	5

Conditions of Use | Privacy Policy

Decisions Pending and Opportunities for Public Participation

Copyright © 1994-2010 California Energy Commission, All Rights Reserved
State of California, Arnold Schwarzenegger, Governor

Last Modified:

EXHIBIT 316

May 28, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Notification of Revision Memo – Blythe Solar Power Project Gen-Tie
Technical Areas: Project Description

Dear Mr. Solomon:

Attached please find the following information for the Blythe Solar Power Project.

If you have any questions on this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-4611
tel (1) 510-524-4517
fax (1) 510-524-5516
Info@SolarMillennium.com
http://www.SolarMillennium.com

As is typical in the ongoing siting evaluation process, project configurations are subject to change based on refinements in engineering design, and feedback from agency staff, interveners and the public. Solar Millennium considers all these as it proceeds toward its goal of permitting and developing its renewable solar thermal energy facilities in the California desert.

Technical Areas: Project Description

Background:

The Applicant has been engaged in extensive discussions with technical staff at the Riverside County Airport Land Use Commission (ALUC) with respect to the proximity of the proposed Blythe Solar Power Project (BSPP) and its associated linear facilities to the Blythe Municipal Airport. The airport is located approximately one mile east of the proposed linears. In discussions with the Project over the past month, the ALUC has expressed interest in a relocation of the proposed gen-tie line, which will extend due south out of the BSPP facility, cross I-10 and then proceed west to a point of interconnection with SCE's proposed Colorado River Substation. The ALUC would prefer that the portion of the current gen-tie route that is west and perpendicular to one of the main runway approaches be moved further west to preclude the potential for any effect on airport operations. Even though the FAA has approved the locations and heights of most of the transmission poles, the ALUC has made it clear that they would like to see an adjustment to this segment of the gen-tie route.

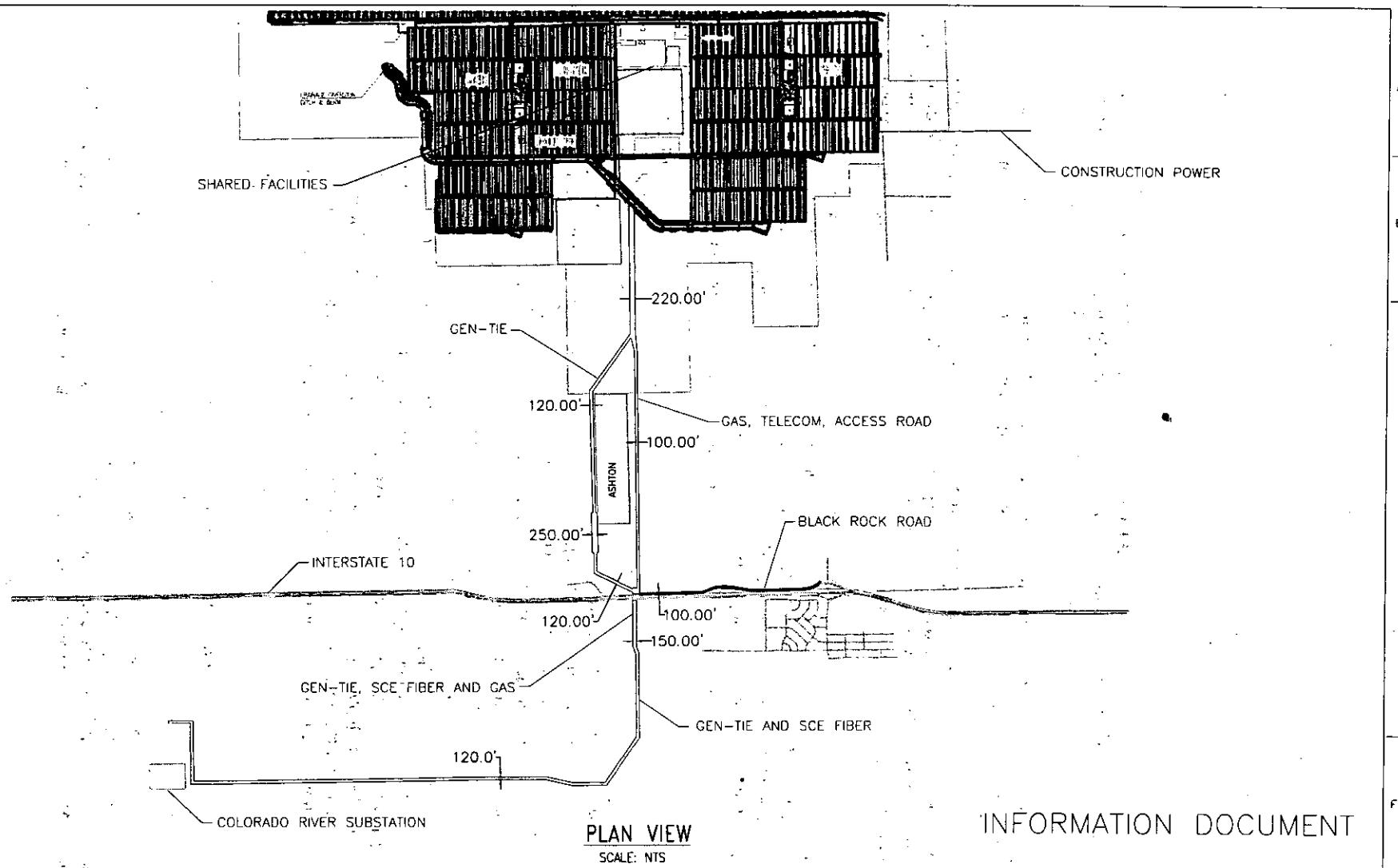
Response:

In response to ALUC's concern and in deference to our future neighbors, Solar Millennium has adjusted the gen-tie route further west. Specifically, Solar Millennium has relocated part of the gen-tie line approximately 0.35 miles west of the original alignment and 120-feet from the western edge of the Ashton private property. The total length of this re-route is approximately 2.3 miles thereby adding an additional 1600-foot to the original linear circuit length. The re-route has introduced four additional angles in the line with the largest angle being 63.14 degrees.

The re-located routing causes the gen-tie to pass through Zone D (90-ft height requirement) and Zone C (70-ft height requirement). The poles in these zones will meet these height requirements. To comply with relevant industry standards including G0-95, we expect four sets of single circuit H-frame structures to be used for the section of line passing through Zone C.

All other utilities including gas, telecommunications, and the site Access Road remain in the original alignment. Please see the attached figure for a representation of the revised alignment.

The adjusted gen-tie alignment has been subjected to protocol level biological and cultural resources surveys. The results of the biological surveys were docketed on May 21, 2010. The cultural resource survey results will be provided separately.



PLAN VIEW

SCALE: NTS

INFORMATION DOCUMENT

NO.	DATE	REVISION	BY	APP.	APP.	FIELD APPR.	NOTES
0	05/31/10	ISSUED FOR INFORMAL REVIEW					

DESCRIPTION | COST ACCOUNT

CONSTRUCTION APPROVAL

APPROVAL | DATE

SCALE: AS SHOWN | DATE

DESIGNED BY | 05/31/10

DRAWN BY

CHECKED BY

APPROVED BY

APPROVED BY

PROFESSIONAL SEAL

AECOM

AECOM
2101 WEBSTER STREET
SUITE 1000
OAKLAND, CALIFORNIA 94612

BLYTHE SOLAR POWER PROJECT
UTILITIES CORRIDOR

JOB NO. | DWG NO. SHEET-1 | REVISION R-0

EXHIBIT 317

GALATI | BLEK LLP

455 Capitol Mall Suite 350
Sacramento CA 95814
Tel· 916.441.6575
Fax· 916.441.6553

June 11, 2010

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

Subject: **PALO VERDE SOLAR I, LLC'S BIOLOGICAL RESOURCES SPRING SURVEY PROTOCOLS**
BLYTHE SOLAR POWER PROJECT
DOCKET NO. (09-AFC-6)

Enclosed for filing with the California Energy Commission is the original of **PALO VERDE SOLAR I, LLC'S BIOLOGICAL RESOURCES SPRING SURVEY PROTOCOLS**, for the Blythe Solar Power Project (09-AFC-6).

Sincerely,

Marie Mills

Marie Mills

April 22, 2010

Alan Solomon
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

RE: **Blythe Solar Power Project, Docket No. 09-AFC-6**
Spring Survey Protocols
Technical Area: Biological Resources

Dear Mr. Solomon:

Solar Millennium is submitting to the California Energy Commission (CEC) the attached summary of biological resource survey studies and methodologies planned or currently being implemented for 2010 for the Blythe Solar Power Project (Project) in the Colorado Desert area of California. The plant site is located near Blythe, in eastern Riverside County. The purpose of this letter is to inform CEC and relevant resource agencies of our biological survey approach and methodologies for this Project site in 2010.

If you have any questions on this submittal, please feel free to contact me directly.

Sincerely,

Alice Harron
Senior Director, Development

Solar Millennium LLC
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-4611
tel (1) 510-524-4517
fax (1) 510-524-5516
info@SolarMillennium.com
http://www.SolarMillennium.com

AECOM

AECOM
1420 Kettner Boulevard
Suite 500
San Diego, CA 92101
www.aecom.com

619.233.1454 tel
619.233.0952 fax

April 22, 2010

Mr. Rick York
California Energy Commission
1516 Ninth Street, MS-40
Sacramento, CA 95814-5512

Subject: Biological Survey Methodologies for the Blythe Solar Power Project Site, 2010

Dear Mr. York:

On behalf of Solar Millennium, LLC, AECOM is submitting to the California Energy Commission (CEC) the attached summary of biological resource survey studies and methodologies planned or currently being implemented for 2010 for the Blythe Solar Power Project (Project) in the Colorado Desert area of California. The plant site is located near Blythe, in eastern Riverside County. The purpose of this letter is to inform CEC and relevant resource agencies of our biological survey approach and methodologies for this Project site in 2010.

As a result of Project refinements and the development of Project alternatives (as required by the Bureau of Land Management [BLM] environmental review process) that occurred after surveys were completed in 2009, the AECOM Team is undertaking additional technical surveys and studies in 2010. These additional surveys are necessary to satisfy Data Requests issued by the CEC during the Applications for Certification (AFC) process and to support related environmental documentation for this Project, as required for Project approval. Survey results will also be used to update environmental baseline information to support permit applications to other federal, state, and local agencies. In particular the survey results will be used to update and fully characterize the existing biological resource conditions on the project site (including alternatives) as requested by the CEC in its Data Requests, to support determinations regarding Project (or alternative) impacts, to further formulate mitigation requirements, and to provide specific data needs of reviewing agencies.

Key to providing Project updates in support of necessary Project approvals and permits described above is the collection of data concerning the occurrence and distribution of biological resources within previously unsurveyed portions of the Project site (including alternatives) and associated buffers. The biological surveys and data collection planned and currently being implemented for 2010 take into account the physical characteristics of areas to be surveyed, the life histories of the target species, and the guidelines and protocols promulgated by the resource agencies.

Consistent with what was requested by the agencies in 2009, the AECOM Team is providing a written summary of the 2010 survey approach and methodologies, together with a detailed map of areas planned for survey at the Project site. Maps of planned survey areas for each biological resource at the Project site are enclosed. Please note that the maps showing planned survey areas are consistent with current Project (and alternative) design and may change with further refinement of the Project or alternative. In the event that the Project site or alternative are further modified after submittal of this letter, survey areas may be adjusted accordingly to meet the same purpose and intent of documenting and evaluating the environmental baseline for biological resources on the Project site. Biological surveys have already been initiated at the Project site (see attached document.

In submitting this information, it is our hope to keep CEC, and the other resource management agencies (BLM, CDFG, and USFWS) that have been involved in the review and approval of this Project, apprised of our efforts related to biological resource surveys on this Project site. It is Solar Millennium's desire to ensure that the surveys conducted at the Project reflect the most current CEC

and resource agency guidance and that the methodologies being implemented are communicated to CEC and resource agencies early in the survey season.

Please call Bill Graham at (619) 233-1454 if you have any questions.

Sincerely,

William Graham
Principal
Bill.Graham@aecom.com

Enclosures:
Blythe Solar Power Project Proposed 2010 Survey Protocols
Figures B-1 through B-4. Blythe Solar Power Project Preliminary Survey Maps 2010

cc: Janet Eubanks, BLM
Holly Roberts, BLM
Mark Massar, BLM
Shelly Ellis, BLM
Larry LaPre, BLM
Magdalena Rodriguez, CDFG
David Hacker, CDFG
Pete Sorenson, USFWS
Tannika Engelhard, USFWS
Danielle Dillard, USFWS
Carl Benz, USFWS

SURVEY APPROACH AND METHODOLOGIES FOR THE SOLAR MILLENNIUM PARABOLIC TROUGH BLYTHE SOLAR POWER PROJECT

2010

Prepared by:

AECOM
1420 Kettner Boulevard, Suite 500
San Diego, California 92101
Phone: (619) 233-1454
Fax: (619) 233-0952

April 2010

TABLE OF CONTENTS

Section **Page**

Biological Resource Survey Approach 1

Biological Resource Survey Protocols 1

Desert Tortoise Protocol 2

Presence-or-Absence Surveys 2

Buffer Transect Sign Surveys 3

Western Burrowing Owl Protocol 3

Phase I Survey: Habitat Assessment 3

Phase II Survey: Burrow Mapping 4

Phase III Survey: Burrowing Owl Surveys, Census, and Mapping 4

Botanical Surveys 4

Vegetation Community Mapping 5

Rare Plant Surveys 6

Additional Survey Considerations 9

Jurisdictional Waters Delineation 10

Formal Delineations for Potential Jurisdictional Waters of the United States 10

Formal Delineations for Potential Jurisdictional Waters of the State 11

Functions and Values Assessments 11

Golden Eagle Surveys 13

General Biological Survey Details 13

References 15

Attachment 1 - Figures

Figure B1 - Blythe Solar Power Project DT Survey Areas - Spring 2010

Figure B2 - Blythe Solar Power Project WBO Survey Areas - Spring 2010

Figure B3 - Blythe Solar Power Project Vegetation Mapping and Rare Plant Surveys - Spring 2010

Figure B4 - Blythe Solar Power Project Jurisdictional Waters Survey Areas - Spring 2010

Attachment 2 - Target List of Special Status Plant Species for 2010 Surveys

Survey Approach and Methodologies for the Solar Millennium Parabolic Trough Blythe Solar Power Project 2010

Biological Resource Survey Approach

After submittal of the Application for Certification (AFC) documents to the California Energy Commission (CEC) in 2009, an alternative site configuration was proposed for the Blythe Solar Power Project (BSPP). Additionally, various Project design refinements were made related to potential transmission line routes and the substation area.

Additional biological surveys are needed in 2010 to gather data concerning an alternative site configuration and changes in linears in support of Project review, approval, and permitting. The following biological resource surveys will be conducted at the Project site during 2010: desert tortoise (*Gopherus agassizii;* DT) survey, burrowing owl (*Athene cunicularia*; WBO) survey, botanical survey (vegetation community mapping and rare plant surveys), golden eagle (*Aquila chrysaetos*; GOEA) survey, and jurisdictional waters delineation.

All protocols to be implemented in 2010, and described herein, are consistent with 2009 survey protocols, with the exception of a few modifications to the DT protocol, rare plant surveys, and jurisdictional waters surveys. DT protocol surveys for 2010 were initiated earlier than in 2009, and earlier than specified in established protocols (with U.S. Fish and Wildlife Service concurrence; see "Desert Tortoise Protocol" below). Botanical surveys in 2010 will address additional special-status plant species not previously included in 2009 surveys (see "Botanical Surveys" below). The jurisdictional waters delineation in 2010 will also include surveys of a 250-foot buffer of Project and Alternative disturbance areas not included in the 2009 surveys (see "Jurisdictional Waters Delineation" below).

Some survey protocols have already been initiated in 2010 at the Project site. DT surveys were initiated on March 15, 2010. Botanical surveys were initiated on March 8, 2010. GOEA surveys have also been initiated. Jurisdictional waters delineation surveys have been completed. WBO surveys have not yet been initiated at the BSPP site but are anticipated to begin during the week of April 26, 2010.

In general, surveys at the Project site will occur within 1) proposed Project disturbance areas (based on footprint refinements) and, 2) Project disturbance area buffer zones that were not previously surveyed in 2009. At the BSPP site, surveys will additionally occur within 3) proposed Project Alternative site disturbance areas (or Alternative disturbance areas) and 4) Alternative disturbance area buffer zones that were not previously surveyed in 2009.

A detailed description of the survey locations and methods for each biological resource survey being implemented in 2010 is provided below.

Biological Resource Survey Protocols

This section identifies the specific locations in which biological resource surveys have already been completed (e.g.., survey extent [2009]) and will be conducted in 2010 (e.g., survey areas [spring 2010] and buffer survey areas [spring 2010]) at the Project site (Figures B-1 through B-4; see Attachment 1 for all figures), and describes the detailed survey methodologies (i.e., protocols) that will be implemented in 2010. If Project or Alternative disturbance areas are further modified after the date listed on this

document, survey areas and protocols may be modified accordingly to meet the purpose and intent of documenting and evaluating the environmental baseline for biological resources on the Project site.

Desert Tortoise Protocol

DT surveys will include a combination of Presence-or-Absence surveys (i.e., 100 percent coverage surveys), and additional transect-based sign surveys within a Project buffer zone. DT Presence-or-Absence surveys will occur in suitable habitat within proposed Project disturbance areas and Alternative disturbance areas for which surveys were not previously conducted in 2009 (Figure B-1). Sign surveys will occur along CEC-required buffer transects (placed at 1,000-foot, 0.75-mile, and 1-mile intervals from disturbance areas) that were not previously surveyed in 2009 (Figure B-1); see below for more complete description of CEC-required buffer transects. A habitat assessment for DT has already been completed at the Project site in February 2010 and areas to be surveyed in 2010 were determined to be potentially suitable for DT.

Presence-or-Absence Surveys

Presence-or-Absence surveys (100 percent coverage surveys) for DT during 2010 will follow the guidelines published in the 1992 U.S. Fish and Wildlife Service (USFWS) survey protocol (USFWS 1992), with the following exception: no surveys of the five zone of influence (ZOI) transects that are typically required outside of and parallel to the disturbance area at 100, 300, 600, 1,200, and 2,400 feet will be conducted. Use of the USFWS 1992 protocol with the exception of ZOI transects (as occurred in 2009), rather than the revised 2009 protocol (USFWS 2009), was agreed upon by USFWS, California Department of Fish and Game (CDFG), U.S. Bureau of Land Management (BLM), and CEC in 2009 prior to survey initiation per an email communication dated March 10, 2009, from Julie Vance (refer to Section 2.2.1 of the AFC).

In accordance with the 1992 USFWS protocol, previously unsurveyed portions of the Project and Alternative disturbance area at the Project site will be surveyed using transects spaced approximately 30 feet apart along transects oriented north to south or along transects that are parallel to the edges of the disturbance areas. The survey will be conducted by slowly and systematically walking linear transects while surveyors visually search for DT and sign. Particular emphasis will be placed on searching around the bases of shrubs and along the banks of shallow washes. All types of DT sign (live tortoises, shells, bones, scutes, limbs, scat, burrows, pallets, tracks, egg shell fragments, drinking sites etc.) will be recorded using a Global Positioning System (GPS) unit. If vegetation or topography reduces the surveyor's ability to see DT sign, the spacing between survey transects will be reduced, as necessary. This would occur in areas with high vegetation density or where topography obscures the surveyor's ability to see DT sign.

Any DTs observed will be measured at middle carapace length (MCL) and evaluated for health. Photographs of DT observations will be taken when possible (e.g., animal not deep in burrow). Photographs of large carcasses and/or unusual sign will also be taken. Burrows, scat, and shell remains will be classified using the Information Index for Desert Tortoise Sign: Burrows and Dens, Scats and Shell Remains as in the USFWS protocol (USFWS 1992).

DT Presence-or-Absence surveys were initiated on March 15, 2010 (with wildlife agency approval; see discussion below) at the BSPP site; at this time mean daily temperatures had reached a minimum of approximately 65°F, adequate annual forage was available for DTs, and evidence of DT activity was observed on the Project site. The proposal to initiate Presence-or-Absence surveys at the BSPP site earlier than the March 25 to May 31 survey period, as stated in the UFSWS 1992 protocol, or the April through May survey period as stated in the USFWS 2009 protocol (USFWS 2009), was presented in a letter to Pete Sorenson at the USFWS (dated March 2, 2010, attached) with subsequent USFWS

concurrence via email from Pete Sorenson on March 16, 2010. DT surveys will continue roughly until the end of April or until the survey effort is completed (prior to May 31).

After completion of Presence-or-Absence surveys, results will be used to calculate estimated adult DT (> 160-mm MCL) abundance within disturbance areas surveyed in 2010. Abundance estimates will be calculated according to the 2009 survey protocol (*Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise* (*Gopherus agassizii*) [USFWS 2009]) if protocol assumptions are met (e.g., minimum of 20 DTs are detected within the survey area).

Buffer Transect Sign Surveys

To comply with the recommendations of the draft CEC *Recommended Biological Resources Field Survey Guidelines for Large Solar Projects* (CEC 2007a), transects outside of and parallel to proposed Project disturbance areas and Alternative disturbance areas will also be surveyed for DT and their sign (Figure B-1). These CEC-required buffer transects will be placed at 3,960 feet (0.75 mile) and 5,280 feet (1 mile) from and parallel to the edge of nonlinear portions of disturbance areas as well as at 1,000 feet from the edge of linear portions of disturbance areas (e.g., transmission line). Surveys along buffer transects will be conducted in a similar fashion as for transects described for Presence-or-Absence surveys, by slowly and systematically walking linear transects while surveyors visually search for DT, their sign, or other special-status species and their sign. Particular emphasis will be placed on searching around the bases of shrubs and along the banks of shallow washes. These transects are more broadly focused than the DT Presence-or-Absence protocol transects, described above, and are not a part of the 1992 USFWS DT protocol requirements. However, they provide additional information on DT occurrence and habitat suitability as well as other biological resources in the area surrounding Project or Alternative disturbance areas.

Western Burrowing Owl Protocol

WBO surveys will focus on suitable habitat in proposed Project disturbance areas Alternative disturbance areas, and surrounding buffer zones that were not surveyed in 2009 (Figure B-2). Surveys will follow the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by The California Burrowing Owl Consortium (CBOC) (1993). In accordance with the protocol, a habitat assessment (Phase I survey) for WBO will be conducted in previously unsurveyed portions of the Project and Alternative disturbance areas and in the surrounding 150-meter (approximately 492-foot) buffer zone. Following the Phase I survey, a focused burrow survey (Phase II survey) and WBO survey (Phase III survey) will be conducted in suitable habitat within proposed disturbance areas and the surrounding 492-foot buffer zone. Also, a more general survey of habitat suitability and occurrence of WBO, other special-status species, and sign will be conducted within a 1-mile CEC buffer surrounding disturbance areas (according to the CEC's Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects [CEC 2007a]), if accessible to the biologists conducting the surveys (see "General Biological Survey Details," below).

The following describes, in more detail, the WBO survey approach and methodology that will be followed in 2010, and is consistent with surveys conducted in 2009.

Phase I Survey: Habitat Assessment

A habitat assessment (Phase I survey) for WBO will be conducted by qualified biologists in early spring 2010. The unsurveyed portions of proposed Project and Alternative disturbance areas and the surrounding 150-meter (approximately 492-foot) buffer zone will be evaluated for suitability for WBO, as well as unsurveyed areas within a 1-mile buffer of proposed disturbance areas. Suitable habitat for WBO includes open habitat with available burrowing opportunities, including agricultural fields (active and fallow), Mojave creosote scrub, desert saltbush, ephemeral washes, and ruderal areas. Suitable habitat will be mapped in the field using high-resolution field maps and GPS units. Any WBOs or WBO sign (e.g., whitewash, pellets, feathers) observed during the Phase I survey will be recorded and mapped.

Phase II Survey: Burrow Mapping

The Phase II burrow survey will be initiated in early spring and will mostly be conducted concurrently with focused Presence-or-Absence DT surveys. The Phase II burrow survey will occur in suitable WBO habitat within previously unsurveyed portions of proposed Project and Alternative disturbance areas, as well as within the 492-foot buffer zone, as required by the CBOC protocol. Where the Phase II burrow survey is conducted concurrently with Presence-or-Absence DT surveys, it will be conducted along pedestrian transects spaced at a maximum of 10 meters (approximately 30 feet) apart; otherwise, spacing between transects may extend up to 30 meters (approximately 100 feet), in accordance with the CBOC protocol. Biologists conducting the Phase II survey will record and map potentially suitable burrows (based on burrow dimensions and characteristics); they will also record and map WBO observations, presence and types of WBO sign (e.g., whitewash, pellets, feathers) observed, and active or potentially active WBO burrows (based on the presence and quality of sign at suitable burrows). These features will be recorded electronically using GPS units and on data forms; WBO observations and potentially active burrows will also be mapped on field maps. Phase II burrow data will also include the type of burrow, if known (e.g., kit fox [*Vulpes macrotis*]; DT), and a GPS identity code.

Phase III Survey: Burrowing Owl Surveys, Census, and Mapping

Phase III surveys will be initiated and completed during the peak breeding season (April 15 through July 15, as defined in the CBOC protocol) and will continue until all burrows with WBO sign have been visited on four separate days. Phase III surveys are intended to determine owl presence on the site and how the site is being used by WBO. It is anticipated that surveys will be completed by the end of May 2010. During the first survey visit of Phase III, previously mapped (during Phase II) suitable burrows will be surveyed by biologists carefully approaching on foot to determine the presence of WBOs and/or WBO sign, in order to assess potential burrow status. Subsequent survey visits (i.e., visits 2–4) will focus on burrows with WBO sign. Based on 2009 survey results, the Project sites are known to include several burrows with WBO sign that is old and degraded, sparse, and absent of any indication of current or recent use. Although all burrows with confirmed WBO sign (including those with old, degraded or sparse sign) will be surveyed four times, only burrows with sign of current or recent occupancy by WBOs will be identified as "potentially active" for purposes of this survey. For any potentially active WBO burrows (i.e., burrows with sign of current or recent occupancy by WBO) identified during visit 1, the burrow areas will be observed during subsequent visits (i.e., visits 2–4) using binoculars or a spotting scope, using the vehicle as a blind (if possible); all other burrows with sign will be approached on foot. It is important to minimize disturbance near active/occupied burrows; if WBOs are detected in association with a burrow, attempts will be made to determine the burrow status without approaching the burrow too closely on foot.

Phase III surveys will be conducted between 1 hour before and 2 hours after sunrise, and between 2 hours before and 1 hour after sunset. Phase III surveys will not be conducted during inclement weather (e.g., wind speeds > 20 miles per hour, heavy rain or fog, etc.). Field data recorded during each survey visit will include date; survey number; weather conditions (temperature, wind, precipitation, cloud cover); surveyor name; start and stop times for each survey visit; location of burrows surveyed during each visit; the suitability of each burrow, based on burrow dimensions and characteristics (collected during first visit to the burrow); presence, absence, and type of WBO sign (if present) at each burrow; occupancy status (active, potentially active, inactive, based on presence and condition of sign); documentation of any WBO detections, including abundance, age, sex, and behavior; and other wildlife species observed. Photographs will be taken of all potentially active burrow locations. In addition, photographs of individual WBOs and active burrows would be taken, if possible without disturbing owls. Any special-status species or their sign observed during these surveys will be recorded electronically using GPS and on data forms.

Botanical Surveys

Botanical surveys in 2010 will include vegetation community mapping (to be conducted during spring) and rare plant surveys (to be conducted during spring and fall, depending on the timing and amount of 2010

precipitation). Vegetation community mapping will occur within proposed Project disturbance areas, Alternative disturbance areas, and within associated one-mile CEC buffers that either were not previously surveyed or need to be resurveyed using a smaller minimum mapping unit (MMU) (refer to "survey areas (Spring 2010)" and buffer survey areas (Spring 2010)" on Figure B-3). Rare plant surveys will occur within the Project (or Alternative) disturbance areas and associated 1-mile CEC buffer areas that were not previously surveyed in 2009 (refer to "survey areas (Spring 2010)" and buffer survey areas (Spring 2010)" on Figure B-3).

Additionally, rare plant surveys at the BSPP site will also occur within proposed disturbance areas (Project or Alternative) and associated one-mile CEC buffer areas (Figure B-3) that were previously surveyed in 2009 (i.e., refer to "survey extent (2009)" on Figure B-3), to the extent necessary, to comply with the December 2009 CEC data request for consideration of 15 additional special-status plant species and detailed mapping of ribbed cryptantha (*Cryptantha costata*).

Botanical surveys were initiated on the BSPP site on March 8, 2010.

Vegetation Community Mapping

Vegetation community mapping during spring 2010 will be conducted in accordance with the same methods as 2009 mapping efforts, with minor updates based on 2009 field experience. These updates include the following topics:

- Scale of field maps: Field maps used for vegetation mapping will have a scale of 1 inch = 700 feet. Maps at a 200-foot scale (used in 2009) were determined to exceed the resolution of the aerial imagery available and were found to be too cumbersome given the large size of the Project sites being surveyed.
- Clarification of mapping intensity: Similar to 2009, survey intensity in 2010 will vary according to the MMU of disturbance areas versus the 1-mile CEC buffers; areas with smaller MMUs (disturbance areas) will be surveyed with greater intensity than areas with larger MMUs (1-mile CEC buffer areas). To accomplish this, field biologists will walk transects at a spacing that allows visual coverage of all unique vegetation signatures having an area equal to or greater than the defined MMU size.

A detailed methodology for 2010 vegetation community mapping is provided below.

Field biologists will use orthotopographic maps at a scale of 1 inch equals 700 feet for both vegetation mapping and recording rare plant points or polygons (see "Rare Plant Surveys" below). If rare plants are documented during vegetation mapping, these sites will be noted and revisited during focused rare plant surveys in order to map plants in more detail and accurately delineate species populations using GPS equipment. Vegetation communities will be classified according to Holland (1986). Sawyer and Keeler-Wolf (1995) and CDFG (2003) classifications will be used to provide additional detail where appropriate, such as denoting special or sensitive vegetation communities that are either known or believed to be of high priority for inventory in the California Natural Diversity Database (CNDDB) due to their unique nature, limited distribution (i.e., rarity), or importance for special status wildlife species.

Vegetation mapping within proposed Project (or Alternative) disturbance areas may be conducted concurrently with rare plant surveys, by having surveyors walk meandering transects; transect spacing will be based on habitat complexity and topography, and will be close enough to allow visual coverage of vegetation signatures at the minimum mapping unit (0.01 acre for riparian areas and 1.0 acre for all other cover types within proposed disturbance areas [Project or Alternative]). Within the buffer, the MMU for all land cover types, including riparian, will be 1.0 acre. Vegetation mapping within the 1-mile CEC Project (or Alternative) buffer areas will therefore be conducted by walking transects within native habitat that are spaced wider than those walked within disturbance areas, but allow visual coverage of vegetation

signatures that are 1.0 acre in size or larger. Developed land and agricultural areas will be surveyed by a combination of walking transects and selecting key vantage points from existing dirt access roads.

Dominant plant species present within each riparian and upland vegetation community mapped on site will be recorded according to the 50/20 dominance rule (U.S. Army Corps of Engineers [USACE] 1987). According to this rule, dominant plant species are defined as those that, when ranked in order of abundance, collectively make up 50 percent relative cover. Each dominant species individually makes up at least 20 percent relative cover, or is needed to surpass the 50 percent relative cover threshold. Once the dominant plant species are identified according to this method, they will be grouped according to relative cover: species below 20 percent, species ranging from 20 to 50 percent cover, and species exceeding 50 percent cover.

Additionally, a description of each vegetation community mapped on site will be recorded including the extent of disturbance, presence of special soils, potential jurisdictional waters, and habitat suitability for rare plant species (see "Rare Plant Surveys", below). Invasive species listed by the California Invasive Plant Council (Cal-IPC) as A-1, A-2, and B status species (Cal-IPC 2009) will be noted when occurring in high concentrations (approximately 108 square feet and larger) and in nearly monotypic stands. Potential invasive plant species that may be encountered during 2010 surveys on the Project site include tamarisk (*Tamarix* spp.), Saharan mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* sp.), red brome (*Bromus madritensis*), and cheat grass (*Bromus tectorum*).

Rare Plant Surveys

Rare plant surveys during spring 2010 will be conducted in accordance with the same methods as 2009 surveys, with updates based on 2009 field experience and CEC guidance. These updates include the following:

- Survey intensity: Detailed descriptions are now provided to explain the differences between survey intensity within the disturbance area versus that in the 1-mile CEC buffer, especially with respect to habitat suitability.
- Habitat suitability: methods for determining habitat suitability have been enhanced at the request of CEC.
- Complete tracklog: each biologist will have a GPS unit recording their path during surveys, and these data will be compiled and submitted with the deliverable.
- Search image: biologists will visit reference sites and/or herbaria specimens to obtain a search image for each targeted California Native Plant Society (CNPS) List 1B or List 2 plant species during the reconnaissance phase of surveys.
- Coachella Valley milkvetch (*Astragalus lentiginosus* var. *coachellae*) focused surveys: if suitable habitat is defined within the disturbance areas and surrounding 1-mile CEC buffers, these areas will be intensively surveyed according to the Coachella Valley milkvetch survey plan (described below). The need for focused Coachella Valley milkvetch surveys is unlikely based on research to date (see below). The survey plan has been created as a precaution.
- Deliverable enhancements: the botanical survey report will include all raw field data as attachments and will contain discussion of special status plant species occurrences with respect to onsite conditions as well as known species ranges and suitable habitats.
- Fall surveys: while late-season surveys were not feasible in 2009 due to limited rainfall, 2010 may have adequate late-summer rainfall to warrant fall surveys and additional consideration has been given to four fall-blooming special status plant species.

A detailed methodology for 2010 rare plant surveys is provided below, which includes 2009 methods as well as the updates noted above.

Rare plant surveys will follow survey guidelines from the following resources: 1) Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed, and Candidate Plants (USFWS 2000); 2) Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (CDFG 2009)[1]; 3) CNPS Botanical Survey Guidelines (CNPS 2001); and 4) Survey Protocols for Survey and Manage Strategy 2: Vascular Plants (Whiteaker et. al. 1998).

Target species for rare plant surveys will include special-status plant species that meet at least one of the following criteria:

- Covered under the Federal or California Endangered Species Act (ESA and CESA, respectively) (CDFG 2009)
- Listed as rare under the California Native Plant Protection Act (Fish and Game Code Section 1900 et seq.)
- BLM sensitive species (BLM Sensitive) (BLM 2009)
- CNPS List: 1A (presumed extinct in California), 1B (rare, threatened, and endangered in California and elsewhere), or 2 (rare, threatened, or endangered in California, but more common elsewhere) species are considered special status plant species if they meet the definitions of Sec. 1901, Chapter 10 (Native Plant Protection Act) or Sections 2050 through 2098 (CESA) (CNPS 2009)
- CNPS List: 3 (plants about which we need more information a review list), or 4 (plants of limited distribution--a watch list was also recorded here) (CNPS 2009)
- Locally significant species, covered under the Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) (BLM 2002) or the West Mojave Plan (WEMO) (BLM 2005)

At the direction of BLM, cottontop cactus (*Echinocactus polycephalus*), hedgehog cactus (*Echinocereus* spp.), and all varieties of California barrel cactus (*Ferocactus cylindraceus*) encountered on site will also be recorded and mapped during rare plant surveys (LaPre 2009). The CEC has identified 15 additional target species above and beyond those considered in 2009 to be specifically targeted during 2010 rare plant surveys, 11 of which have potential to occur on the Project site (see Attachment 2). Attachment 2 contains the complete list of plant species that will be targeted during 2010 rare plant surveys.

Rare plant surveys will be "intuitive controlled" (per Whiteaker et al. 1998). The surveys will be conducted by walking transects placed systematically throughout disturbance areas (Project and Alternative) and associated 1-mile CEC buffers while searching for target plant species and suitable habitats. In disturbance areas not previously surveyed during 2009, botanists will traverse all representative habitats, providing complete visual coverage in areas determined to be suitable for target plant species (including microhabitats) (see Attachment 2 for target plant list). This will include closely spaced transects in the desert washes, incised channels, and sandy dune habitats (50-100 feet, possibly less depending on topographic complexity) and wider spacing in the flat creosote bush scrub and desert pavement (approximately 100-200 feet, or more depending on visibility). Transects will follow topographic relief rather than predefined survey grids, for the purpose of providing focused coverage of the desert washes.

1. This document replaced the DFG document entitled "Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened and Endangered Plants and Natural Communities."

Resurveys will occur as many times as necessary to ensure the blooming periods of all target rare plant species have been covered.[2] Additionally, disturbance areas that were previously surveyed in 2009 would be revisited systematically, as deemed appropriate based on field conditions, in order to comply with the December 2009 CEC data request for consideration of 15 additional special-status plant species and detailed mapping of ribbed cryptantha (*Cryptantha costata*).

In the 1-mile CEC buffer areas, suitable habitats associated with the major desert washes or sandy dune habitats will also be surveyed with complete visual coverage but the areas may not be resurveyed with the same rigor as the disturbance area and isolated microhabitats (areas much less than 1 acre in size and not associated with the desert washes or larger dune complexes) may not be examined with complete visual coverage at the discretion of the lead field botanist.

Suitable habitats will be determined based on geography, slope aspect, soil substrate, vegetation community, associated plant species, and familiarity with each species based on reference populations and historical surveys conducted in the region. Unsuitable habitats may be traversed while traveling between areas of suitable habitat, providing partial survey coverage in these areas. Each field botanist will carry a GPS to record their path through the Project site(s) each day.

The exception to the "intuitive controlled" method described above is with respect to the Coachella Valley milkvetch surveys. This federally endangered plant species must receive more focused attention in areas of suitable habitat where the species has potential to occur. Andrew Sanders has determined that Coachella Valley milkvetch is not currently documented outside of the Coachella Valley area. To reach this conclusion, Mr. Sanders thoroughly reviewed the vouchered collections (identified as Coachella Valley milkvetch) from the Desert Center area (Dice 980324-2; Dice 980324-3; and Sears 1173) and other collection data (e.g., http://ucjeps.berkeley.edu/consortium/ and University of California at Riverside (UCR) herbaria specimens). After careful consideration, Mr. Sanders found the Desert Center collections (i.e., all Coachella Valley milkvetch collections outside the Coachella Valley) to be *Astragalus lentiginosus* var. *variabilis* rather than *A. lentiginosus* var. *coachellae*.

Therefore, focused surveys for Coachella Valley milkvetch will not be necessary at the BSPP site unless the species is observed on site or Andrew Sanders encounters additional information leading to a reversal of his findings. Prior to the end of the survey window for Coachella Valley milkvetch (late May), a letter from Andrew Sanders will be provided to USFWS, CDFG, CEC, and BLM to finalize and defend the treatment of Coachella Valley milkvetch during 2010 rare plant surveys.

In the event that focused surveys for Coachella Valley milkvetch do occur, a survey plan has been prepared and is located below (see "Supplemental Survey Methods for Coachella Valley Milkvetch (if Necessary)", below).

The timing of rare plant surveys will be based on the most phenologically appropriate time for each target plant species; surveys will occur when reproductive structures (i.e., flowers and fruits) and distinctive leafy parts are present and easily identifiable. When possible, known locations of rare plants in the vicinity of the Project site will be visited to verify the status of these species during the 2010 growing season

2. In DR-BIO-81 of the AECOM Response to the CEC Data Request (December 2009), it was suggested that biologists should walk 10-20 meter parallel transects within all habitats of the disturbance areas, regardless of habitat suitability. This approach has been revised, since habitat complexity will dictate how far each botanist will be able to see and will therefore dictate the necessary spacing. AECOM botanists have consulted with regional experts including Andy Sanders and David Silverman to conclude that intuitive controlled surveys per Whiteaker et al. 1998 are sufficient for documenting a complete floral inventory on site (including the target special status plant species).

(germinating, flowering, seeding, etc.). If reference site visits are not possible, specimens from the UCR Herbarium will be studied to inform field biologists of important keying characters.

In general, the ideal survey window for 2010 will be closely associated with the rainfall pattern, considering both rainfall totals and the timing of precipitation. Several survey visits may be necessary to accommodate the distinct phenologies of each target rare plant species with potential to occur on the Project site, including surveys during both spring and fall (if rainfall is sufficient for fall-blooming species). It is anticipated that approximately 2-5 survey visits may be necessary to complete rare plant surveys.

During rare plant surveys (spring or fall) each field botanist will record a complete floral inventory, including the phenology(ies) observed (to document the blooming period and calibrate the timing of additional surveys). Plant nomenclature will follow that of *The Jepson Desert Manual* (Baldwin et. al. 2002). Additionally, scientific names will be used in all records to avoid confusion between taxa. Time will be allotted as necessary to confirm the identity of unknown species to the taxonomic level necessary to determine whether it is a target rare plant species or not (e.g., genus, species, or subspecies/variety).

If a target rare plant population is located, the population will be assessed for vigor and possible threats (e.g., off-road vehicle activity and invasive plants) and the number of individuals will be counted (or subsampled and population size estimated in the event of large populations). All sensitive plant locations identified will be recorded directly with submeter handheld GPS units and will be subsequently mapped on aerial photo-based field maps (700-foot scale orthotopographic maps). Rare plant detections will be mapped either as individual point locations (for single plants) or as occupied polygons (for groups of plants). The threshold distance for distinguishing point locations from polygons will be 7 meters; for example, plants occurring within 7 meters of each other will be included in a polygon, and plants beyond the 7-meter threshold will be documented using individual points).

In addition to mapping special status species occurrences, suitable habitat for the target species will be assessed and mapped. In many cases, not enough information is known about microhabitat preferences of a species to define its habitat beyond the level of vegetation communities.

CNDDB forms will be completed and submitted to CDFG (as publically available data) for all special-status plant species observed. Voucher specimens of special-status plant species will be collected if it is determined that such collection would not jeopardize the existing population. These collections will be submitted to the UCR herbarium.

Additional Survey Considerations

During vegetation mapping and rare plant surveys, field botanists will document any creosote bush rings observed if they are readily distinguishable.

Regional experts will be consulted for guidance through all phases of survey work for concurrence with the methods employed by AECOM survey teams. This includes botanists such as David Silverman (of Xeric Specialties Consulting) and Andrew Sanders (of the UCR Herbarium). These experts will receive copies of this methodology for approval, and once in the field they will train crews on species identification, conduct expert habitat assessments, and provide guidance on optimal survey timing for the targeted special status plant species.

Supplemental Survey Methods for Coachella Valley Milkvetch (if Necessary)

All surveys for rare plants will be conducted in compliance with the standardized guidelines issued by the regulatory agencies (USFWS 2000, CDFG 2000, and the CNPS 2001). The species specific methods presented below are intended to be a supplement to the standardized guidelines.

Surveys for Coachella Valley milkvetch will be conducted from approximately February through May 2010, depending upon climactic conditions. The number of surveys required will depend upon the phenology of the populations at the reference sites. It is presumed that two to three separate surveys will be required. Prior to initiating surveys, vouchered specimens deposited at the UCR herbarium will be studied to insure survey personnel are familiar with the species. Visits to one or more known locations of Coachella Valley milkvetch will be conducted to determine current phenology and detectability.

Systematic surveys will be conducted to detect presence and determine distribution of Coachella Valley milkvetch within the survey area. The survey area will only include areas of suitable Coachella Valley milkvetch habitat along the substation and transmission line disturbance area and buffer area. For systematic surveys, biologists will walk parallel transects 5 to 10 meters apart throughout the entire survey area. The survey transects will be recorded with a GPS track log using a submeter handheld GPS. Survey crews will include at least one member who has seen Coachella Valley milkvetch in its natural habitat. Other survey members will be trained using photographs and/or herbarium specimens.

If Coachella Valley milkvetch is detected within the survey area results will be recorded as described below. One herbarium specimen will be deposited at the UCR herbarium, if it is determined that collection will not jeopardize the existing population.

Jurisdictional Waters Delineation

A formal delineation for potential jurisdictional waters of the United States and of the State was completed in April 2010 at the Project site within portions of the disturbance area (Project and Alternative), and within a 250-foot buffer of these areas, for which surveys were not previously conducted in 2009 (Figure B-4). Additionally a qualitative functions and values assessment for ambient conditions and projected post-project conditions of these areas was also completed.

Formal Delineations for Potential Jurisdictional Waters of the United States

Jurisdictional waters of the United States are defined in 33 CFR. 328.3 (Definitions). Previously unsurveyed portions of the proposed Project disturbance area and Alternative disturbance area at the Project site have the potential for the presence of, at a minimum, two types of federally regulated waters, warranting the following:

1. Formal delineations for waters of the United States in the form of wetlands based on the three-parameter method.[3] The three-parameter method for identifying and delineating wetlands is outlined in and in accordance with Federal guidance and procedure following the *Corps of Engineers Wetlands Delineation* (Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (2008 Supplement) (Environmental Laboratory 2008).[4]

2. Formal delineations for other waters of the United States to define and identify the jurisdictional lateral extent of nonwetland waters using field indicators of ordinary high water mark (OHWM) as defined by 33 CFR 238.3(e), Federal guidance and procedure outlined in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (USACE 2008), and *Distribution of Ordinary High Water Mark*

3. The three-parameter method is the simultaneous presence (co-occurrence) of wetland hydrology, hydric soil, and hydrophytic vegetation.

4. The Manual and 2008 Supplement are guidance documents for delineating jurisdictional waters in the form of wetlands only.

(OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" (Lichvar et al. 2006).

3. Other relevant Federal guidance and procedural documents (e.g., Regulatory Guidance Letter, Special Public Notices, and USACE Los Angeles District specific guidance)

Formal Delineations for Potential Jurisdictional Waters of the State

The California Code of Regulations (Title 14 CCR 1.72) defines a stream as: "...a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation." Under Section 1600 *et seq.* of the California Fish and Game Code (CFGC), CDFG regulates activities that would alter the flow, bed, channel, or bank of streams and lakes. The limits of CDFG jurisdiction are defined in CFGC Section 1600 *et seq.* as the "bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit." However, in practice, CDFG usually extends its jurisdictional limit and assertion to the top of a bank of a stream, the bank of a lake, or outer edge of the riparian vegetation, whichever is wider.

CFGC Section 1602(a) is based on Title 14 CCR 720: "For the purpose of implementing Sections 1601 and 1603 of the Fish and Game Code which requires submission to the department of general plans sufficient to indicate the nature of a project for construction by or on behalf of any person, governmental agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed of any river, stream or lake designated by the department, or will use material from the streambeds designated by the department, all rivers, streams, lakes, and streambeds in the State of California, including all rivers, streams and streambeds which may have intermittent flows of water, are hereby designated for such purpose".

Boundaries for xeric riparian waters of the State will be determined (and recorded) by the presence of shelving and/or scour resulting in an established bank, bed, and channel of an ephemeral wash feature and its associated riparian areas (where applicable). In specific areas within the ephemeral wash channels, where evidence of shelving or scour is absent, subsurface investigations will be undertaken to identify established channel banks. Although some portions of the ephemeral washes present shelving with smooth-toe transitions, these features are composed of friable sand and are evidence of recent sand deposition covering the bank features.

For wetlands and other aquatic habitats occurring in California, CDFG relies on the USFWS wetland definition and classification system, which is based on *Classification of Wetland and Deepwater Habitats of the United States* (Cowardin et al. 1979). Therefore, jurisdictional wetland delineations within disturbance areas will be conducted based on the one-parameter[5] method outlined in CDFG/USFWS guidance documents and classification manual(s) to define presence and State jurisdictional extent. The Cowardin method requires diligence to avoid false positive conclusions (e.g., concluding that an area with no transitional relation to the aquatic system is a wetland based on presence of vegetation equally likely to be found in wetland or nonwetland circumstances).

Functions and Values Assessments

A qualitative assessment of the functions and values will also be conducted for ephemeral stream (i.e., xeric riparian) features identified in unsurveyed portions of proposed Project and Alternative disturbance

5. For Federal jurisdictional waters, a determination for the presence of wetland is based on the presence of three parameters occurring simultaneously at the area of investigation and study. These three wetland parameters are 1) hydrophytic vegetation, 2) hydric soils, and 3) wetland hydrology. Therefore, for State-defined wetlands, only one of these three wetland criteria is required to be present for the State to consider an aquatic feature a wetland.

areas at the Project site. This qualitative assessment utilized the Hydrogeomorphic Approach (HGM) to assess the physical, chemical, and biological functions and values of xeric riparian features utilizing a synthesis of the methodologies and definitions outlined in:

1. *A Hydrogeomorphic Classification for Wetlands* as a guide (Brinson et al. 1995)
2. *An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices* (Smith et al. 1995)
3. *Wetland Values: Concepts and Methods for Wetlands Evaluation* (USACE 1979)
4. *The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest* (U.S. Environmental Protection Agency [USEPA] 2008)
5. USEPA Watershed Academy: *Wetland Functions and Values* (USEPA 2009)
6. U.S. Geologic Survey (USGS) Water Supply Paper 2425: *Wetland Functions, Values, and Assessment* (USGS 1996)

The assessment will be based on observations made during above-mentioned jurisdictional delineation field surveys and other resource surveys (e.g. cultural, botanical, and wildlife) occurring in 2010. The assessment is intended to quantitatively evaluate ambient and projected post-project desert aquatic (including xeric riparian) features without a reference site. Since the assessment will not be based on a comparison to an actual reference site in the field, the qualitative rankings of variables used for the assessment of the quality of functions and values will be confined to the quality of the habitats within the study area.

Brinson et. al. (1995), Smith et al. (1995), and USEPA (2008) will be used as the primary guidance documents for assessing xeric riparian function, which include assessment of the following four major functional categories:

1. Hydrologic Function
2. Biogeochemical Function
3. Plant Habitat Function
4. Animal Habitat Function

USACE (1979), USEPA (2009) and USGS (1996) will be used as the primary guidance documents for assessing xeric riparian values, which include assessment of the following seven major value categories:

1. Aquifer Recharge (including Base Flow and Water Supply)
2. Flood Protection
3. Water Quality
4. Economic
5. Aesthetic
6. Recreational
7. Cultural

Xeric riparian values 1 through 4 will be incorporated within xeric riparian functions because wetland values also arise from the many ecological functions associated with wetlands (USEPA 2009). Xeric riparian values 5 through 7 will be ascertained through subjective review during the jurisdictional

delineation field assessment, a review of related documents such as cultural resources reports, the Riverside or Kern County General Plans, and speaking with resource agency personnel.

Golden Eagle Surveys

A GOEA field survey will be conducted in 2010 of the BSPP site within proposed Project and Alternative disturbance areas and within an associated buffer zone; however, these surveys are being conducted by an entity other than the AECOM Team.

Helicopter-and ground-based raptor surveys shall be conducted, following the USFWS interim guidelines for GOEA surveys (USFWS 2010), to record and report occupancy (Phase 1) and productivity (Phase 2) of resident golden eagles including, but not limited to, the following:

- individual activities,
- nests and territories on and surrounding the subject solar farm project, and within an approximate 10-mile radius of the proposed Project (assumed USFWS requirement)

The first survey (Phase 1 helicopter survey) has already been completed and a second survey (Phase 2) will begin a minimum of 30 days after the Phase 1 survey was conducted.

General Biological Survey Details

In addition to above-described protocols, the following general surveys actions/approaches will be taken by the AECOM survey team.

- While conducting biological resource surveys at the Project site in 2010 (e.g., DT surveys, WBO surveys, vegetation mapping and rare plant surveys, etc.) biologists will also be looking for and recording occurrences of all sensitive, listed, or other special-status wildlife species or their sign, including but not limited to:
    - Potential bat roosting sites—caves, abandoned buildings, cliffs etc.
    - Nelson's bighorn sheep
    - American badger (*Taxidea taxus*)
    - Mohave ground squirrel
    - Desert kit fox (*Vulpes macrotis*)
    - Mojave fringe-toed lizard (*Uma scoparia*)
    - Loggerhead shrike (*Lanius ludovicianus*)
    - Bendire's thrasher (*Toxostoma bendirei*)
    - Crissal thrasher (*Toxostoma crissale*)
    - Gilded flicker (*Colaptes chrysoides*)
    - Gila woodpecker (*Melanerpes uropygialis*)
    - Raptors
        - Northern harrier (*Circus cyaneus*)
        - White-tailed kite (*Elanus leucurus*)
        - Cooper's hawk (*Accipiter cooperii*)
        - Peregrine falcon (*Falco peregrinus*)
        - Prairie falcon (*Falco mexicanus*)
        - Swainson's hawk
        - Golden eagle
        - Ferruginous hawk (*Buteo regalis*)

- All surveyors will be given Desert Tortoise Awareness training.
- All surveyors will be briefed on potential rare plants within their survey area, including descriptions and photographs/drawings. Biologists will record coordinates and take photographs of any potential occurrences of rare plants and communicate this information to an AECOM Team botanist for verification immediately.
- Within areas of the 1-mile disturbance area (Project or Alternative) survey buffer not previously surveyed, a more general survey of habitat suitability and occurrence of special-status species and their sign will be conducted (according to the CEC's Draft Recommended Biological Resources Field Survey Guidelines for Large Solar Projects [CEC 2007]), if accessible to the biologists conducting the surveys.

References

AECOM 2010. Blythe Solar Power Project (09-AFC-9) CEC Staff Data Requests Set 1 filed on December 7, 2009.

Baldwin, B., S. Boyd, B. Ertter, R. Patterson, T. Rosatti, and D. Wilken. 2002. The Jepson Desert Manual: Vascular Plants of Southeastern California. Univ. of California Press Wilken, Berkeley.

Brinson, M., R. Rheinhardy, F. Hauer, L. Lee, W. Nutter, R. Smith, and D. Whigham. 1995. A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands. U.S. Army Corps of Engineers Waterways Experiment Station. Wetlands Research Program Technical Report WRP-DE-11. December 1995 – Operation Draft.

Bureau of Land Management (BLM). 2002. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan. Available at http://www.blm.gov/ca/news/pdfs/ neco2002/Table%20of%20Contents.pdf.

Bureau of Land Management (BLM). 2009. California BLM Special-Status Plants – (All) as of 3/26/09. Available at http://www.blm.gov/ca/pa/ssp/lists/by_species/ssplist_all.html. Accessed June 29, 2009.

California Burrowing Owl Consortium (CBOC). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April.

California Department of Fish and Game (CDFG). 1996. Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities. Revised May 8, 2000.

California Department of Fish and Game (CDFG). 2003. California Department of Fish and Game Wildlife Habitat Data Analysis Branch. The Vegetation Classification and Mapping Program – List of California Terrestrial Natural Communities Recognized by the California Natural Diversity Database. Available at http://www.dfg.ca.gov/whdab/ pdfs/natcomlist.pdf. September.

California Department of Fish and Game (CDFG). 2009a. California Department of Fish and Game. RareFind 3 computer program. California Natural Diversity Database (CNDDB) California Department of Fish and Game, State of California Resources Agency. Sacramento, California.

California Department of Fish and Game (CDFG). 2009b. Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. Revised November 24, 2009.

California Energy Commission (CEC). 2007a. Recommended Biological Resources Field Survey Guidelines for Large Solar Projects (Draft).

California Energy Commission (CEC). 2007b. Rules of Practice and Procedure & Power Plant Site Certification Regulations. Siting Regulations.

California Invasive Plant Council (Cal-IPC). 2009. Invasive Plants of California's Wildland: Plants listed by category. Available at http://www.cal-ipc.org/ip/management/ipcw/ categories.php#cala. Accessed on July 5, 2009.

California Native Plant Society (CNPS). 2001. CNPS Botanical Survey Guidelines. Pages 38–40 in California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California (D.P. Tibor, editor). Sixth edition. Special Publication No. 1, California Native Plant Society, Sacramento, 387 pp.

California Native Plant Society (CNPS). 2009. Inventory of Rare and Endangered Plants of California, California Native Plant Society, Sacramento, California. Available at http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi/Search?search={CNPS_LIST}%20= ~%20m/./i. Accessed June 29, 2009 (version v7-09b 4-10-09).

Cowardin, L., V. Carter, F. Golet, and E. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of Interior. U.S. Fish and Wildlife Service. FWS/OBS-79/31. December.

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Engineer Waterways Experiment Station. Vicksburg, Mississippi.

Environmental Laboratory. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). September.

Hickman, J., Editor. 1993. The Jepson Manual: Higher Plants of California. University of California Press, Berkeley, California.

Holland, R. 1986. Preliminary Descriptions of the Terrestrial Natural Communities of California. Nongame Heritage Program, State of California Department of Fish and Game.

LaPre, Larry. 2009. Personal communication via email from BLM to map specific cactus species. March.

Lichvar, R.W., Finnegan, D.C., Ericsson, M.P., and Ochs, W. 2006. Distribution of Ordinary High Water Mark (OHWM) indicators and their reliability in identifying the limits of "Waters of the United States" in arid southwestern channels. ERDC/CRREL TR-06-5.

Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin, and D. F. DeSante. 1993. Handbook of Field Methods for Monitoring Landbirds. General Technical Report PSW-GTR-144, Pacific Southwest Research Station, Albany, California.

Sawyer, J.O., and T. Keeler-Wolf. 1995. A Manual of California Vegetation. California Native Plant Society, Sacramento, California.

Smith, D. R., A. Ammann, C. Bartoldus, and M. M. Brinson. 1995An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices. Technical Report WRP-DE-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS. NTIS No. AD A307 121.

U.S. Army Corps of Engineers (USACE) 1979. Wetland Values: Concepts and Methods for Wetlands Evaluation. Research report 79-R1, U.S. Army Corps of Engineers, Institute for Water Resources, Fort Belvoir, Virginia.

U.S. Army Corps of Engineers (USACE) 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual ERDC/CRREL TR-08-12.

U.S. Environmental Protection Agency (USEPA). 2008 The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest. Office of Research and Development.

U.S. Environmental Protection Agency (USEPA). 2009 Watershed Academy http://www.epa.gov/watertrain/index.htm.

U.S. Geological Survey (USGS) 1996 Water Supply Paper 2425: Wetland Functions, Values, and Assessment. Available at: http://water.usgs.gov/nwsum/WSP2425/functions.html.

U.S. Fish and Wildlife Service (USFWS). 1992. Field Survey Protocol for Any Federal Action That May Occur within the Range of the Desert Tortoise.

U.S. Fish and Wildlife Service (USFWS). 2000. Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Species. January.

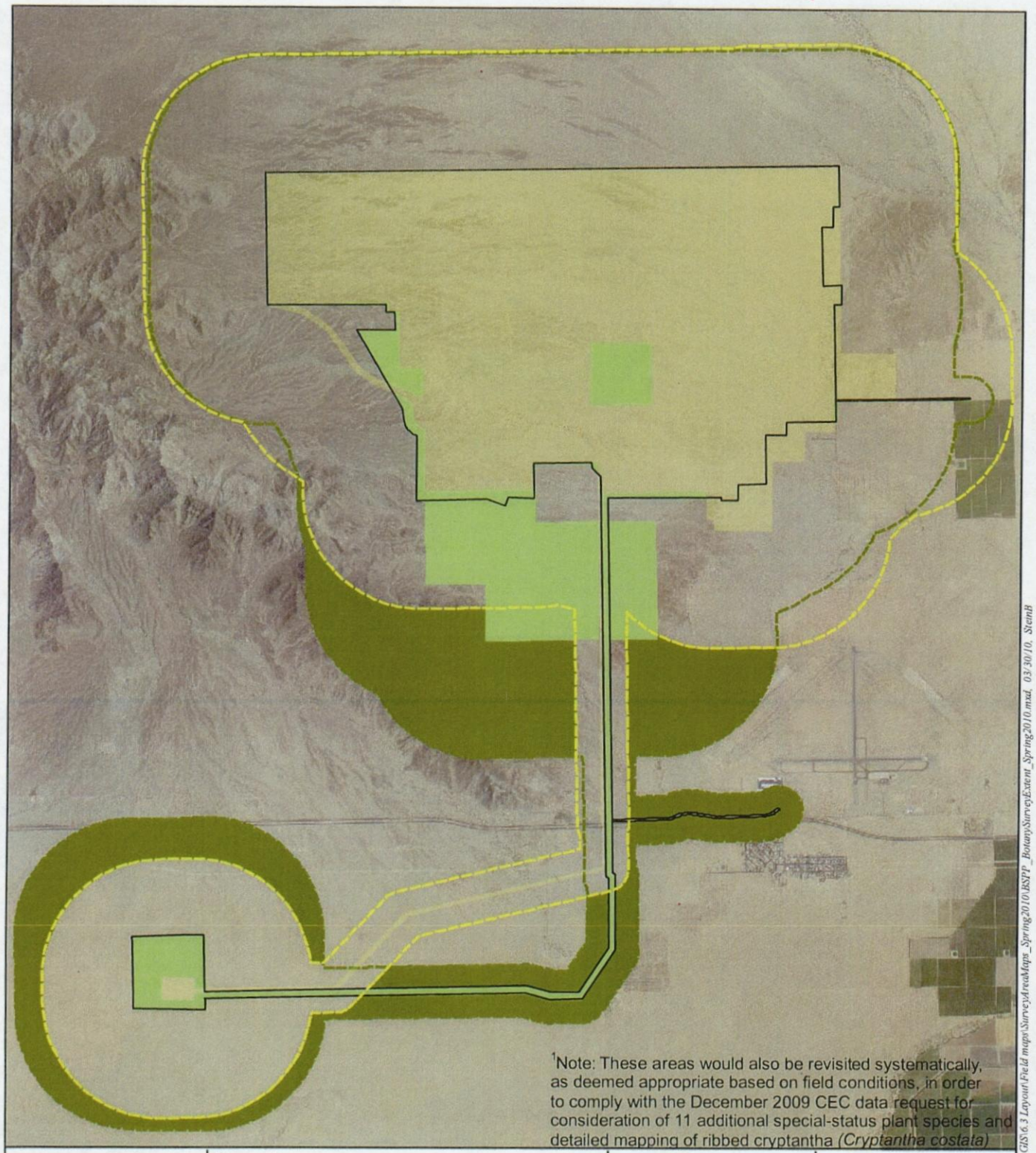
U.S. Fish and Wildlife Service (USFWS). 2009. Preparing for Any Action That May Occur within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*), April.

U.S. Fish and Wildlife Service (USFWS). 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitorin Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. February.

Whiteaker, L., J. Henderson, R. Holmes, L. Hoover, R. Lesher, J. Lippert, E. Olson, L. Potash, J. Seevers, M. Stein, and N. Wogen. 1998. Survey Protocols for Survey and Manage Strategy 2: Vascular Plants. Available at http://www.blm.gov/or/plans/surveyand manage/SP/VascularPlants/cover.htm.

Attachment 1

Figures



Map Location

Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)[1]
- BRSA (Surveyed 2009)
- Survey Areas (Spring 2010)
- BRSA (Spring 2010)
- Buffer Survey Areas (Spring 2010)

0 6,000 12,000 Feet

Blythe Solar Power Project
Figure B-3

Vegetation Mapping and Rare Plant Surveys Spring 2010

Source: NAIP 2009: AECOM 2010

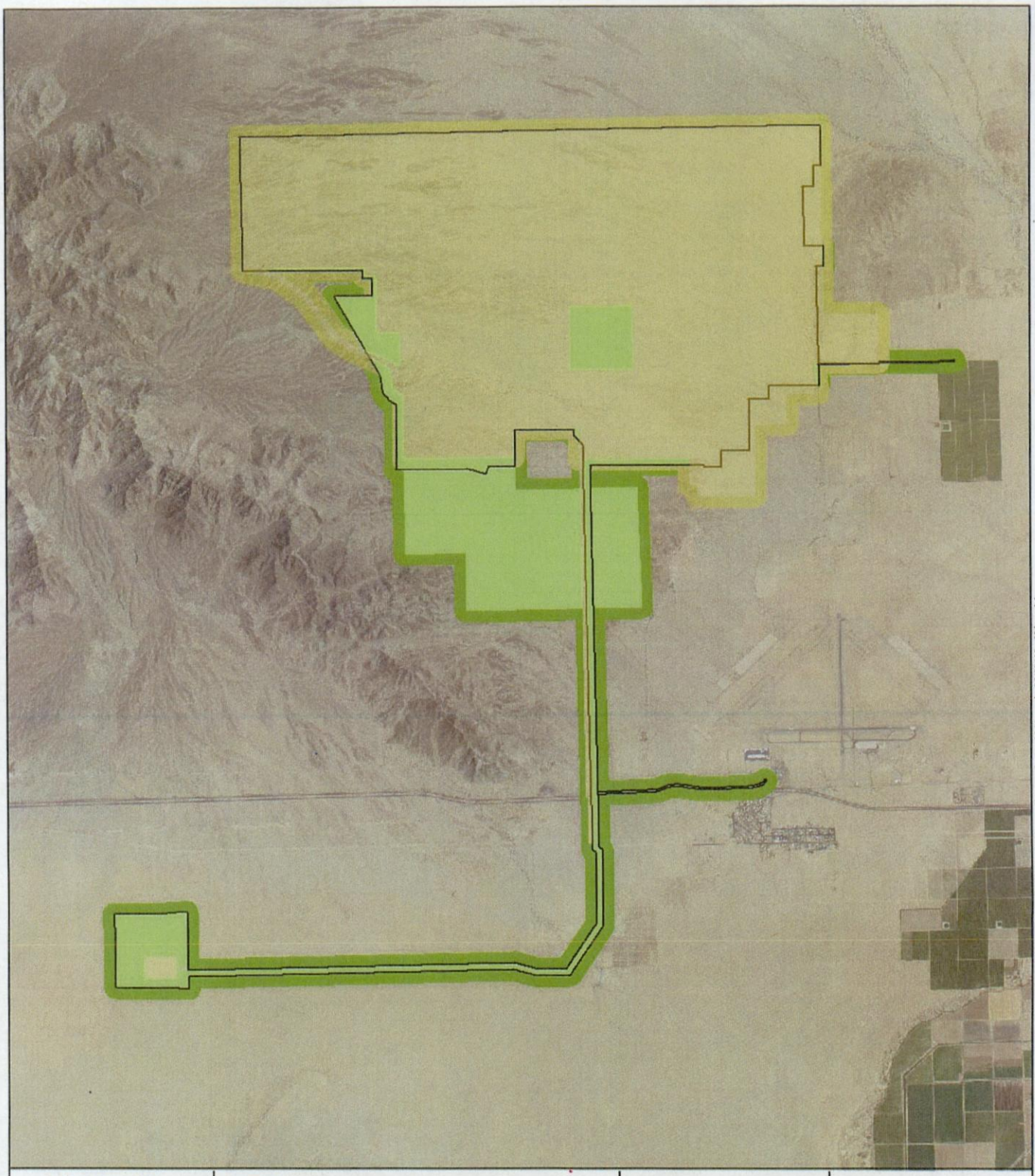
1 inch = 6,000 feet

N W E S

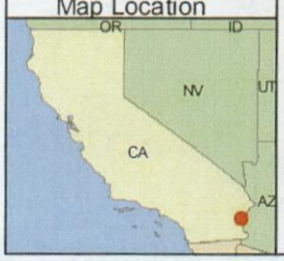
AECOM

Date: March 2010

Path: P:\200910908082 Sol Mil Blythe\6.0 GIS\6.3 Layout-Field maps\SurveyAreaMaps_Spring2010\BSPP_BotanySurveyExtent_Spring2010.mxd 03/30/10 SteinB



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Areas (Spring 2010)
- Buffer Survey Area (Spring 2010)
- Survey Extent (2009)
- Buffer Surveyed Areas (Surveyed 2009)

0 1 2 Miles

Blythe Solar Power Project
Figure B-2

BUOW Field Survey Areas Spring 2010

Source: NAIP 2009: AECOM 2010

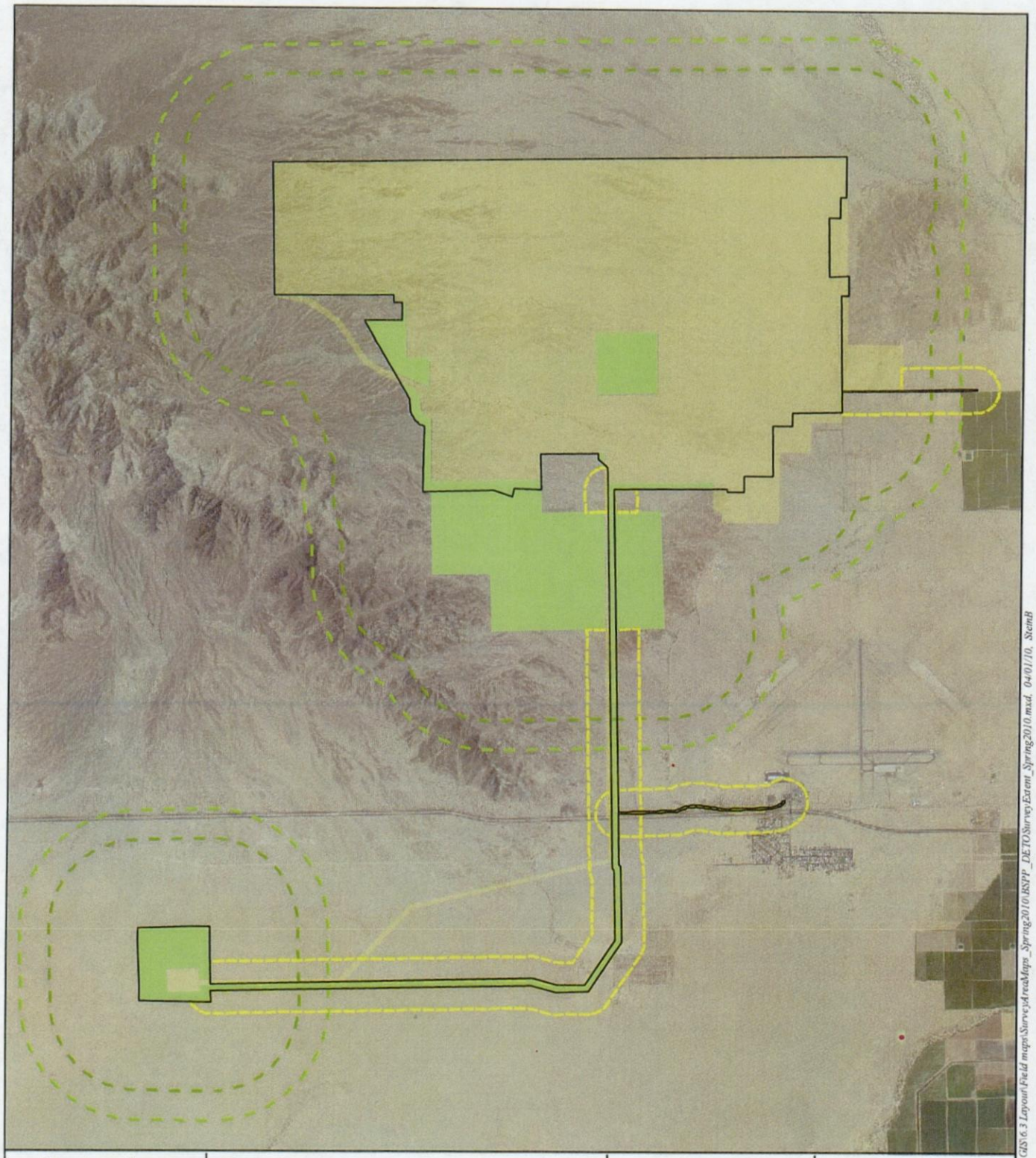
1 inch = 1 miles

N W E S

AECOM

Date: March 2010

Path: P:\60091090080082 Sol Mil Blythe\6.0 GIS\6.3 Layout\Field maps\SurveyAreaMaps_Spring2010\BSPP_BUOWSurveyExtent_Spring2010.mxd 03/30/10 NdemoM



Map Location

Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)
- Survey Areas (Spring 2010)
- 1000ft BufferTransect (Spring 2010)
- Buffer Transect 3/4-mile
- Buffer Transect 1-mile

0 1 2 Miles

Blythe Solar Power Project Figure B-1

Desert Tortoise Survey Areas Spring 2010

Source: NAIP 2009: AECOM 2010

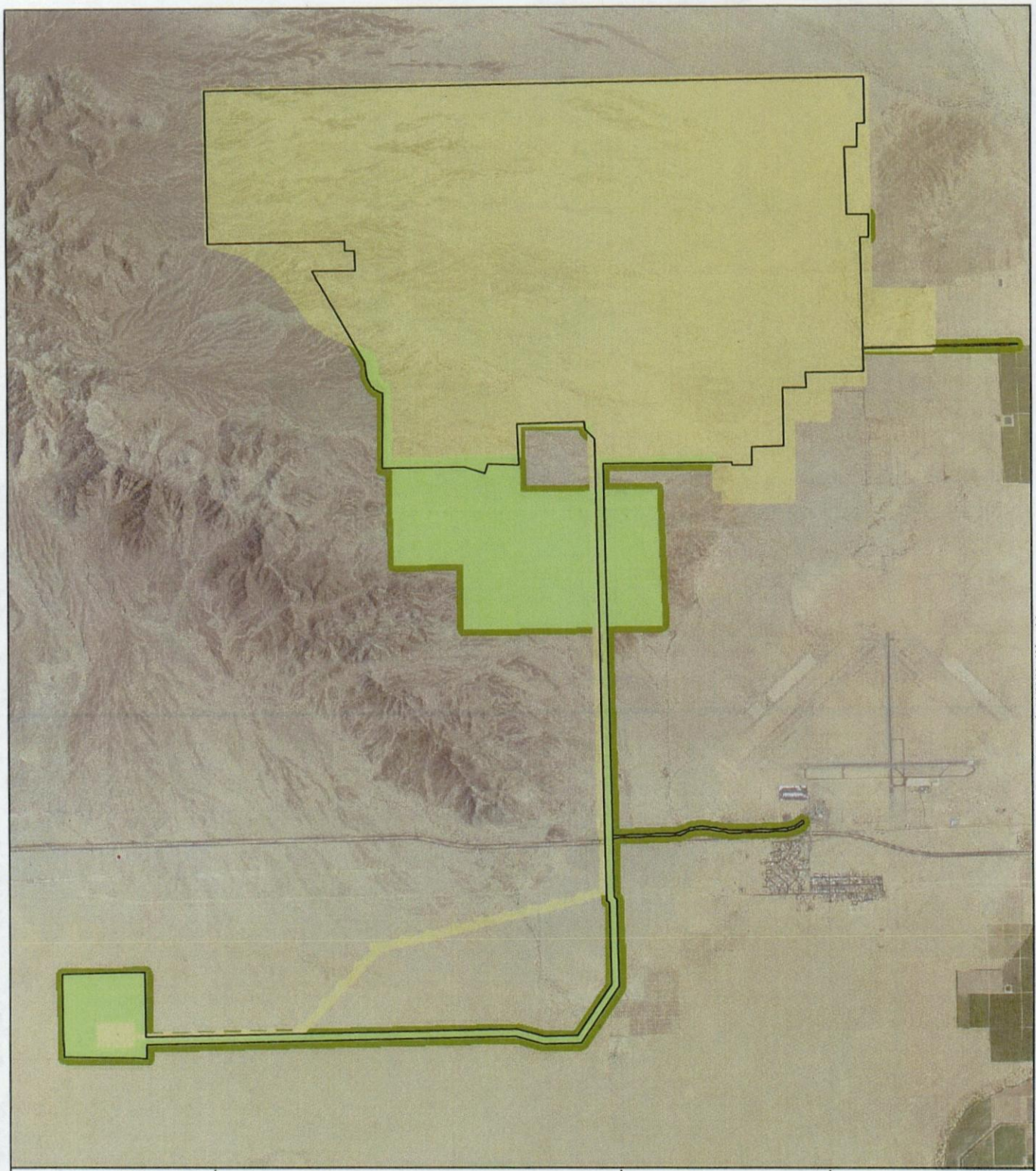
1 inch = 1 miles

N W E S

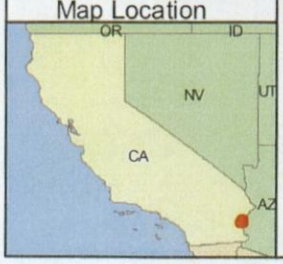
AECOM

Date: March 2010

Path: P:\60160808082 Sol Mil Blythe\6.0 GIS\6.3 Layout\Field maps\SurveyAreaMaps_Spring2010\BSPP_DETOSurveyExtent_Spring2010.mxd 04/01/10, SteinB



Map Location



Legend

- Disturbance Area (March 2010)
- Survey Extent (2009)
- Survey Areas (Spring 2010)
- Buffer Survey Areas (Spring 2010)

0 1 2 Miles

Blythe Solar Power Project
Figure B-4

Jurisdictional Waters Survey Areas Spring 2010

Source: NAIP 2009: AECOM 2010

1 inch = 1 miles

N W E S

AECOM

Date: March 2010

Path: P:\2009\09080082 Sol Mil Blythe\6.0 GIS\6.3 Layout\Field maps\SurveyAreaMaps_Spring2010\BSPP_JDSurveyExtent_Spring2010.mxd, 03/30/10, NdemoM

Attachment 2

Target List of Special Status Plant Species for 2010 Surveys

Attachment 2
Target List of Special Status Plant Species for 2010 Surveys
Blythe Solar Power Project

Scientific Name	Common Name	Status[3]	Expected Fall or Spring[4]
Acleisanthes longiflora	Angel trumpets	CNPS List 2.3 NECO	Spring
Androstephium breviflorum[1]	small-flowered androstephium	CNPS List 2.2	Spring
Astragalus insularis var. harwoodii	Harwood's milkvetch	CNPS List 2.2 NECO	Spring
Astragalus lentiginosus var. coachellae	Coachella Valley milkvetch	ESA: Threatened CNPS List 1B.2	Spring
Ayenia compacta[1]	California ayenia	CNPS List 2.3	Spring
Calliandra eriophylla	Fairyduster	CNPS List 2.3 NECO	Spring
Calochortus striatus	Alkali mariposa-lily	CNPS: List 1B.2 BLM: Sensitive	Spring
Castela emoryi	Crucifixion thorn	CNPS List 2.3 NECO	Spring
Chamaesyce abramsiana[1]	Abram's spurge	CNPS List 2.2	Fall
Chamaesyce platysperma[1]	Flat-seeded spurge	CNPS List 1B.2	Fall
Colubrina californica	Las Animas colubrine	CNPS List 2.3 NECO	Spring
Condalia globosa var. pubescens[1]	bitter snakewood	CNPS List 4.2	Spring
Corypantha alversonii	Foxtail cactus	CNPS List 4.3 NECO	Spring
Cryptantha costata[1]	ribbed cryptantha	CNPS List 4.3	Spring
Cryptantha holoptera[1]	winged cryptantha	CNPS List 4.3	Spring
Cynanchum utahense	Utah milkvine	CNPS List 4.3 NECO	Spring
Ditaxis claryana	glandular ditaxis	CNPS List 2 .2 NECO	Spring or Fall
Ditaxis serrata var. californica	California ditaxis	CNPS List 3.2 NECO	Spring or Fall
Echinocactus polycephalus var. polycephalus[2]	cottontop cactus	No special status (considered but rejected)	Spring
Echinocereus engelmannii[2]	hedgehog cactus	CNPS List 1B.1 (var. *howei*)	Spring
Echinocereus triglochidiatus[2]	hedgehog cactus	No special status	Spring

Scientific Name	Common Name	Status[3]	Expected Fall or Spring[4]
Eriastrum harwoodii[1]	Harwood's woollystar	CNPS List 1B.2	Spring
Ferocactus cylindraceus[2]	California barrel cactus	No special status	Spring
Horsfordia alata[1]	pink velvet mallow	CNPS List 4.3	Spring or Fall
Hymenoxys odorata[1]	bitter hymenoxys	CNPS List 2	Spring or Fall
Imperata brevifolia	California satintail	CNPS List 2.1	Spring or Fall
Matelea parvifolia[1]	spearleaf	CNPS List 2.3	Spring
Mentzelia puberula[1]	Argus blazing star	No special status (taxonomy unresolved)	Spring
Physalis lobata[1]	lobed ground cherry	CNPS List 2.3	Fall
Portulaca halimoides[1]	desert portulaca	CNPS List 4.2	Fall
Proboscidea althaeifolia[1]	desert unicorn plant	CNPS List 4.3	Spring
Salvia greatae	Orocopia sage	CNPS List 1B.3 NECO	Spring
Selaginella eremophila	Desert spikemoss	CNPS List 2.2	Spring
Senna covesii	Coves' cassia	CNPS List 2.2 NECO	Spring
Teucrium cubense ssp. *depressum*	dwarf germander	CNPS List 2.2	Spring
Wislizenia refracta ssp. *refracta*	Jackass clover	CNPS List 2.2 NECO	Spring or Fall
Xylorhiza orcuttii	Orcutt's Woody-aster	CNPS List 1B.2 BLM Sensitive	Spring

1. Species requested to be surveyed by CEC (AECOM 2010)
2. Species requested to be surveyed by BLM (LaPre 2009)
3. Sensitivity Status Key

ESA Federal Endangered Species Act (ESA) Threatened

CNPS California Native Plant Society Lists:

1B: Considered rare, threatened, or endangered in California and elsewhere

2: Plants rare, threatened, or endangered in California, but more common elsewhere

3: Plants for which we need more information – Review list

4: Plants of Limited Distribution – A Watch list

Decimal notations: .1 – Seriously endangered in California, .2 – Fairly endangered in California, .3 – Not very endangered in California

BLM Special Status Plants (Palm Springs Field Office)

NECO Special-status species considered in analysis of the Northern and Eastern Colorado Coordinated Management Plan (BLM 2002).

4. Based on the known blooming periods of these plant species, many of these species are opportunistic with respect to rainfall. While they have been listed in this table as occurring Spring, Fall, or Both, actual blooming times will correlate more closely with the climate than the calendar. Field surveys will be comprehensive, not selective; all plants on this list will be considered during all surveys, regardless of the probability of finding them. A complete floral inventory will be recorded for the site as well.

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 *BLYTHE SOLAR POWER PLANT PROJECT*

Docket No. 09-AFC-6

PROOF OF SERVICE
(Revised 5/3/10)

APPLICANT
Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillennium.com

Elizabeth Ingram, Associate Developer, Solar Millennium, LLC
1625 Shattuck Avenue
Berkeley, CA 94709
ingram@solarmillennium.com

Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
carl.lindner@aecom.com

Ram Ambatipudi
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

Co-COUNSEL
Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL
Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES
California ISO
e-recipient@caiso.com

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262 Office
CAPSSolarBlythe@blm.gov

INTERVENORS
*** California Unions for Reliable Energy (CURE)**
c/o: Tany A. Gulesserian, Elizabeth Klebaner
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gate Way Boulevard, Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

ENERGY COMMISSION
KAREN DOUGLAS
Chairman and Presiding Member
kldougla@energy.state.ca.us

ROBERT WEISENMILLER
Commissioner and Associate Member
rweisenm@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Siting Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Marie Mills, declare that on June 11, 2010, I served and filed copies of the attached **PALO VERDE SOLAR I, LLC'S BIOLOGICAL RESOURCES SPRING SURVEY PROTOCOLS**, dated **April 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://www.energy.ca.gov/sitingcases/solar_millennium_blythe]

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

(Check all that Apply)

FOR SERVICE TO ALL OTHER PARTIES:

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

__X__ by personal delivery or by depositing in the United States mail at 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-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

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

Marie Mills

Marie Mills

EXHIBIT 318

Declaration

I, Janet M. Laurain, declare as follows:

1. I am a paralegal at Adams Broadwell Joseph & Cardozo. I make this declaration from my personal knowledge. If called as a witness, I could testify competently to facts stated in this declaration.

2. On February 3, 2010, I submitted a Freedom of Information Act request for copies of all correspondence, analyses, memos, notes, electronic mail messages, files, charts, maps, and/or other documents referring or relating to the Blythe Solar Power Plant Project to the Bureau of Land Management.

3. On April 12, 2010, I received a response to my February 3, 2010 request, indicating that the copies for the Blythe and Palen Projects are estimated at 80,000 to 100,000 pages. Attached as Exhibit 319 is a true and correct copy of the Bureau of Land Management's response to my February 3, 2010 request.

4. On June 7, 2010, I received authorization from the Bureau of Land Management to arrange for a copy service to copy some of those documents.

5. Included among those documents was a letter from John Kalish, US Dept of the Interior, to Apple and Doolittle, AECOM (8/5/09), authorizing cultural resources fieldwork under Cultural Resource Use Permit CA-09-22 and Fieldwork Authorization No. 66.24-09-18, included as Exhibit 320.

6. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this 15th day of June, 2010, at South San Francisco, California.

Janet M. Laurain

Janet M. Laurain

EXHIBIT 319

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262-8001
(760) 833-7100 Fax (760) 833-7199

TAKE PRIDE IN AMERICA

Visit us on the Internet at
www.blm.gov/ca/palmsprings/

In Reply Refer To:
1278 (I)
CAD060.13

APR 12 2010

Janet Laurain
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard
Suite 1000
South San Francisco, CA 94080

Dear Ms. Laurain:

This letter is in response to your multiple Freedom of Information Act (FOIA) requests dated February 3rd and February 22, 2010. In your requests you asked for copies of all applications and file materials in the possession of the Bureau of Land Management regarding the following companies, projects and case files:

- "a copy of materials in the Bureau's possession related to the Solar Millennium LLC Blythe Solar Project ... [including but not limited to] any and all correspondence, analyses, memos, notes, electronic mail messages, files, charts, maps and / or other documents by, to or from the Project applicant, Solar Millennium LLC, or its consultants, the Bureau, or any other private or governmental entity or individual referring or relating to the Project;
- "a copy of materials in the Bureau's possession related to the Solar Millennium LLC Palen Solar Project ... [including but not limited to] any and all correspondence, analyses, memos, notes, electronic mail messages, files, charts, maps and / or other documents by, to or from the Project applicant, Solar Millennium LLC, or its consultants, the Bureau, or any other private or governmental entity or individual referring or relating to the Project;
- "a copy of all emails in the Bureau's possession related to the Genesis Solar Energy project proposed for public land adjacent to the Ford Dry Lake in eastern Riverside County (California Energy Commission Docket No. 09-AFC-8)".

We have located documents that are responsive to your request for these companies and projects. We are in the process of enumerating them to obtain an estimate for you of projected costs, as you have asked. At this point, the copies of email relating to the Genesis Solar Energy project is estimated to run at least 550 pages. The search time did not exceed the two free hours allotted to the 'other' category. An estimated charge for 550 pages at $.13 / page, less the first 100 pages,

which are free to 'other' requestors, is within the limit you had suggested. If we complete our final count for this request and find that the number of pages is considerably higher, we will contact you again before finishing.

The copies of documents for the Blythe and Palen projects is estimated to run somewhere between 80,000 and 100,000 pages. The costs, therefore, at $.13 / page, are estimated to be more than you had indicated you are willing to pay. If you would like to revise any of your requests, please respond soon.

If you have any questions concerning this response, please contact FOIA Coordinator Cam D'Angeles, at (760) 833-7108.

Sincerely,

John R. Kalish
Field Manager
Palm Springs South Coast Field Office

EXHIBIT 320

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262-8001
(760) 833-7100 Fax (760) 833-7199

TAKE PRIDE IN AMERICA

Visit us on the Internet at
www.blm.gov/ca/palmsprings/

AUG 05 2009

IN REPLY REFER TO:
8150 (P)
CAD060.24
FA# 66.24 09-18

Rebecca McCorkle Apple and Christopher Doolittle
AECOM
1461 E. Cooley Drive, Suite 100
Colton, CA 92324

Dear Rebecca,

This letter confers authorization to perform cultural resources fieldwork under Cultural Resource Use Permit CA-09-22 and Fieldwork Authorization No. 66.24-09-18 on lands managed by the Palm Springs-South Coast (PSSC) Field Office. This authorization applies only to the proposed Solar Millennium/Chevron Blythe Solar Power Project and authorizes survey and archaeological monitoring of the project area, as defined on the attached Fieldwork Authorization Form (map previously provided). The guidelines for carrying out site recordation, evaluation and reporting are provided by the California Office of Historic Preservation, the Department of the Interior Secretary's Standards and Guidelines for Archaeology and Historic Preservation, and the BLM 8110 Manual (Identifying and Evaluating Cultural Resources, 2004). Please follow the reporting format provided in the California Office of Historic Preservation's publication *Archaeological Resource Management Reports (ARMR)* and use the Department of Parks and Recreation (DPR 523) forms for recording sites and isolates.

The following stipulations apply:

1. This authorization is for survey and monitoring only. Survey transects shall be appropriate to accomplish a full-coverage, Class III survey. No surface artifacts should be collected. If it is determined that collection of artifacts or subsurface testing is necessary to complete a site evaluation or to protect resources from immediate danger or destruction, please contact the designated BLM Archaeologist for instruction and authorization.

3. Please provide the Field Office Cultural Resources Specialist with a copy of your preliminary monitoring report, including site forms, for review within six weeks of completing the fieldwork. Submit the draft in both hard-copy and as a Word document.

4. Two hard-copies of the final report, including site forms with assigned P-numbers, shall be

provided to the Palm Springs-South Coast Field Office on a mutually agreed-upon date or no later than 180 days after completion of field work. Included in the report shall be the results of site evaluation and your recommendations of National Register eligibility for each site (per 36 CFR 60.4), as well as a summary of potential impacts to those sites and recommendations for mitigation or avoidance of impacts, as applicable. Provide site forms and maps of site locations in a separate and confidential technical appendix. Reports and site forms must also be submitted on disk in pdf format. Please incorporate all geospatial data into the cultural geodatabase that was previously provided.

5. Please notify the Palm Springs - South Coast BLM office when fieldwork has been completed.

6. All terms and conditions of the Cultural Resource Use Permit National Stipulations and the California Resource Use Permits Special Permit Conditions remain in effect and in force. Please note that only the individual(s) listed in Item No. 8 of the permit is/are authorized to be in direct charge of field work conducted under this permit. The person(s) in direct charge of field work shall be on site at all times when work is in progress.

Thank you for your assistance. Should you have questions, please don't hesitate to contact Palm Springs Archaeologist Chris Dalu at (760) 833-7105 or cdalu@ca.blm.gov.

Sincerely,

John R. Kalish
Field Manager

Enclosure

AECOM

AECOM
1461 E. Cooley Drive, Suite 100
Colton, CA 92324
T +1 909.554.5000 F +1 909.424.1924 www.aecom.com

August 4, 2009

Mr. Chris Dalu
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262-8001

Dear Mr. Dalu,

Subject: Fieldwork Authorization Request

I would like to request a Fieldwork Authorization under State Permit Number CA-09-22 issued to Christopher Doolittle on July 7, 2009.

Under the direction of Rebecca Apple, MA, RPA, trained archaeologists will monitor ongoing geotechnical and water testing work in support of the Blythe Solar Power Project under development by Solar Millennium and Chevron Energy Solutions. This work builds upon a completed Class-III survey of the Project area which identified numerous prehistoric and historic archaeological sites. Archaeological monitoring is being provided to ensure that the identified cultural resources are avoided by the geotechnical and water testing crews.

This work may continue until September 30, 2009.

Sincerely,

p.p.

Christopher J. Doolittle, MA, RPA
Senior Archaeologist
christopher.doolittle@aecom.com

Form 8151-3

Authorization # (BLM Use): 66.24-09-18 CAlc

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ARIZONA STATE OFFICE

FIELDWORK AUTHORIZATION REQUEST

To Conduct Specific Cultural Resource Work Under the Authority of a Cultural Resource Use Permit Issued by the Bureau of Land Management Pursuant to Sec. 302(b) of P.L. 94-579, October 21, 1976, 43 U.S.C. 1732 and Sec. 4 of P.L. 96-95, October 31, 1979, 16 U.S.C. 470cc

1. Permit Number and Date Issued: CA-09-22 (July 7, 2009)

2. Name of Permittee: Christopher J. Doolittle, M.A., R.P.A.

3. Mailing Address and Telephone Number:
AECOM
1461 E. Cooley Drive, Suite 100
Colton, CA 92324
T. 909.554-5000 F. 909.424.1924

4. Nature of Cultural Resource Work (If consultation work, identify client and project)
Archaeological monitoring of geotechnical investigations in support of the Blythe Solar Power Project undertaken by Solar Millennium and Chevron Energy Solutions

5. Location of Work (Include map)

a. Description of Public Lands Involved
This project entails the development of BLM lands in the northern Colorado Desert west of Blythe.

b. Identification of Cultural Resource(s) Involved (if applicable)
A Class III survey has identified numerous historic and prehistoric sites on the Project property. Monitoring is intended to avoid any impact to these cultural resources.

6. Period During Which Work Will Be Conducted
From August 3, 2009 To September 30, 2009

7. Name of Individual(s) Responsible for Planning & Supervising Field Work & Approving Reports, Evaluations & Recommendations
Rebecca Apple, M.A., R.P.A.

8. Signature of Permittee

9. Date 8-7-09

- The individual named in item 7 above shall be present during the conduct of field work authorized herein, or shall notify the authorized officer of the need for any extended absence, and shall make provision that the work will be carried out under supervision of equal quality, by an individual approved by the authorized officer.
- All terms and conditions of the permit continue to apply; any special conditions attached hereto have the same force and effect as conditions of the permit.
- Permittee shall immediately notify the authorized officer of any change in items 3 through 7 above.

Fieldwork Authorization Request approved by:

(Signature of BLM Authorized Officer)

Date Aug. 6, 09

Submit this request, by mail or in person, to the BLM Field Manager who administers the lands involved.

EXHIBIT 321

United Nations Declaration on the Rights of Indigenous Peoples

Resolution adopted by the General Assembly

[*without reference to a Main Committee (A/61/L.67 and Add.1)*]

61/295. United Nations Declaration on the Rights of Indigenous Peoples

The General Assembly,

Taking note of the recommendation of the Human Rights Council contained in its resolution 1/2 of 29 June 2006,[1] by which the Council adopted the text of the United Nations Declaration on the Rights of Indigenous Peoples,

Recalling its resolution 61/178 of 20 December 2006, by which it decided to defer consideration of and action on the Declaration to allow time for further consultations thereon, and also decided to conclude its consideration before the end of the sixty-first session of the General Assembly,

Adopts the United Nations Declaration on the Rights of Indigenous Peoples as contained in the annex to the present resolution.

107th plenary meeting
13 September 2007

Annex

United Nations Declaration on the Rights of Indigenous Peoples

The General Assembly,

Guided by the purposes and principles of the Charter of the United Nations, and good faith in the fulfilment of the obligations assumed by States in accordance with the Charter,

Affirming that indigenous peoples are equal to all other peoples, while recognizing the right of all peoples to be different, to consider themselves different, and to be respected as such,

[1] See *Official Records of the General Assembly, Sixty-first Session, Supplement No. 53* (A/61/53), part one, chap. II, sect. A.

Affirming also that all peoples contribute to the diversity and richness of civilizations and cultures, which constitute the common heritage of humankind,

Affirming further that all doctrines, policies and practices based on or advocating superiority of peoples or individuals on the basis of national origin or racial, religious, ethnic or cultural differences are racist, scientifically false, legally invalid, morally condemnable and socially unjust,

Reaffirming that indigenous peoples, in the exercise of their rights, should be free from discrimination of any kind,

Concerned that indigenous peoples have suffered from historic injustices as a result of, inter alia, their colonization and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their right to development in accordance with their own needs and interests,

Recognizing the urgent need to respect and promote the inherent rights of indigenous peoples which derive from their political, economic and social structures and from their cultures, spiritual traditions, histories and philosophies, especially their rights to their lands, territories and resources,

Recognizing also the urgent need to respect and promote the rights of indigenous peoples affirmed in treaties, agreements and other constructive arrangements with States,

Welcoming the fact that indigenous peoples are organizing themselves for political, economic, social and cultural enhancement and in order to bring to an end all forms of discrimination and oppression wherever they occur,

Convinced that control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs,

Recognizing that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment,

Emphasizing the contribution of the demilitarization of the lands and territories of indigenous peoples to peace, economic and social

progress and development, understanding and friendly relations among nations and peoples of the world,

Recognizing in particular the right of indigenous families and communities to retain shared responsibility for the upbringing, training, education and well-being of their children, consistent with the rights of the child,

Considering that the rights affirmed in treaties, agreements and other constructive arrangements between States and indigenous peoples are, in some situations, matters of international concern, interest, responsibility and character,

Considering also that treaties, agreements and other constructive arrangements, and the relationship they represent, are the basis for a strengthened partnership between indigenous peoples and States,

Acknowledging that the Charter of the United Nations, the International Covenant on Economic, Social and Cultural Rights[2] and the International Covenant on Civil and Political Rights,[2] as well as the Vienna Declaration and Programme of Action,[3] affirm the fundamental importance of the right to self-determination of all peoples, by virtue of which they freely determine their political status and freely pursue their economic, social and cultural development,

Bearing in mind that nothing in this Declaration may be used to deny any peoples their right to self-determination, exercised in conformity with international law,

Convinced that the recognition of the rights of indigenous peoples in this Declaration will enhance harmonious and cooperative relations between the State and indigenous peoples, based on principles of justice, democracy, respect for human rights, non-discrimination and good faith,

Encouraging States to comply with and effectively implement all their obligations as they apply to indigenous peoples under international instruments, in particular those related to human rights, in consultation and cooperation with the peoples concerned,

Emphasizing that the United Nations has an important and continuing role to play in promoting and protecting the rights of indigenous peoples,

---

[2] See resolution 2200 A (XXI), annex.

[3] A/CONF.157/24 (Part I), chap. III.

Believing that this Declaration is a further important step forward for the recognition, promotion and protection of the rights and freedoms of indigenous peoples and in the development of relevant activities of the United Nations system in this field,

Recognizing and reaffirming that indigenous individuals are entitled without discrimination to all human rights recognized in international law, and that indigenous peoples possess collective rights which are indispensable for their existence, well-being and integral development as peoples,

Recognizing that the situation of indigenous peoples varies from region to region and from country to country and that the significance of national and regional particularities and various historical and cultural backgrounds should be taken into consideration,

Solemnly proclaims the following United Nations Declaration on the Rights of Indigenous Peoples as a standard of achievement to be pursued in a spirit of partnership and mutual respect:

Article 1

Indigenous peoples have the right to the full enjoyment, as a collective or as individuals, of all human rights and fundamental freedoms as recognized in the Charter of the United Nations, the Universal Declaration of Human Rights[4] and international human rights law.

Article 2

Indigenous peoples and individuals are free and equal to all other peoples and individuals and have the right to be free from any kind of discrimination, in the exercise of their rights, in particular that based on their indigenous origin or identity.

Article 3

Indigenous peoples have the right to self-determination. By virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development.

Article 4

Indigenous peoples, in exercising their right to self-determination, have the right to autonomy or self-government in matters relating to

[4] Resolution 217 A (III).

their internal and local affairs, as well as ways and means for financing their autonomous functions.

Article 5

Indigenous peoples have the right to maintain and strengthen their distinct political, legal, economic, social and cultural institutions, while retaining their right to participate fully, if they so choose, in the political, economic, social and cultural life of the State.

Article 6

Every indigenous individual has the right to a nationality.

Article 7

1. Indigenous individuals have the rights to life, physical and mental integrity, liberty and security of person.

2. Indigenous peoples have the collective right to live in freedom, peace and security as distinct peoples and shall not be subjected to any act of genocide or any other act of violence, including forcibly removing children of the group to another group.

Article 8

1. Indigenous peoples and individuals have the right not to be subjected to forced assimilation or destruction of their culture.

2. States shall provide effective mechanisms for prevention of, and redress for:

(*a*) Any action which has the aim or effect of depriving them of their integrity as distinct peoples, or of their cultural values or ethnic identities;

(*b*) Any action which has the aim or effect of dispossessing them of their lands, territories or resources;

(*c*) Any form of forced population transfer which has the aim or effect of violating or undermining any of their rights;

(*d*) Any form of forced assimilation or integration;

(*e*) Any form of propaganda designed to promote or incite racial or ethnic discrimination directed against them.

Article 9

Indigenous peoples and individuals have the right to belong to an indigenous community or nation, in accordance with the traditions and customs of the community or nation concerned. No discrimination of any kind may arise from the exercise of such a right.

Article 10

Indigenous peoples shall not be forcibly removed from their lands or territories. No relocation shall take place without the free, prior and informed consent of the indigenous peoples concerned and after agreement on just and fair compensation and, where possible, with the option of return.

Article 11

1. Indigenous peoples have the right to practise and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artefacts, designs, ceremonies, technologies and visual and performing arts and literature.

2. States shall provide redress through effective mechanisms, which may include restitution, developed in conjunction with indigenous peoples, with respect to their cultural, intellectual, religious and spiritual property taken without their free, prior and informed consent or in violation of their laws, traditions and customs.

Article 12

1. Indigenous peoples have the right to manifest, practise, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of their ceremonial objects; and the right to the repatriation of their human remains.

2. States shall seek to enable the access and/or repatriation of ceremonial objects and human remains in their possession through fair, transparent and effective mechanisms developed in conjunction with indigenous peoples concerned.

Article 13

1. Indigenous peoples have the right to revitalize, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures, and to designate and retain their own names for communities, places and persons.

2. States shall take effective measures to ensure that this right is protected and also to ensure that indigenous peoples can understand and be understood in political, legal and administrative proceedings, where necessary through the provision of interpretation or by other appropriate means.

Article 14

1. Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning.

2. Indigenous individuals, particularly children, have the right to all levels and forms of education of the State without discrimination.

3. States shall, in conjunction with indigenous peoples, take effective measures, in order for indigenous individuals, particularly children, including those living outside their communities, to have access, when possible, to an education in their own culture and provided in their own language.

Article 15

1. Indigenous peoples have the right to the dignity and diversity of their cultures, traditions, histories and aspirations which shall be appropriately reflected in education and public information.

2. States shall take effective measures, in consultation and cooperation with the indigenous peoples concerned, to combat prejudice and eliminate discrimination and to promote tolerance, understanding and good relations among indigenous peoples and all other segments of society.

Article 16

1. Indigenous peoples have the right to establish their own media in their own languages and to have access to all forms of non-indigenous media without discrimination.

2. States shall take effective measures to ensure that State-owned media duly reflect indigenous cultural diversity. States, without prejudice to ensuring full freedom of expression, should encourage privately owned media to adequately reflect indigenous cultural diversity.

Article 17

1. Indigenous individuals and peoples have the right to enjoy fully all rights established under applicable international and domestic labour law.

2. States shall in consultation and cooperation with indigenous peoples take specific measures to protect indigenous children from economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development, taking into account their special vulnerability and the importance of education for their empowerment.

3. Indigenous individuals have the right not to be subjected to any discriminatory conditions of labour and, inter alia, employment or salary.

Article 18

Indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures, as well as to maintain and develop their own indigenous decision-making institutions.

Article 19

States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them.

Article 20

1. Indigenous peoples have the right to maintain and develop their political, economic and social systems or institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities.

2. Indigenous peoples deprived of their means of subsistence and development are entitled to just and fair redress.

Article 21

1. Indigenous peoples have the right, without discrimination, to the improvement of their economic and social conditions, including, inter alia, in the areas of education, employment, vocational training and retraining, housing, sanitation, health and social security.

2. States shall take effective measures and, where appropriate, special measures to ensure continuing improvement of their economic and social conditions. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities.

Article 22

1. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities in the implementation of this Declaration.

2. States shall take measures, in conjunction with indigenous peoples, to ensure that indigenous women and children enjoy the full protection and guarantees against all forms of violence and discrimination.

Article 23

Indigenous peoples have the right to determine and develop priorities and strategies for exercising their right to development. In particular, indigenous peoples have the right to be actively involved in developing and determining health, housing and other economic and social programmes affecting them and, as far as possible, to administer such programmes through their own institutions.

Article 24

1. Indigenous peoples have the right to their traditional medicines and to maintain their health practices, including the conservation of their vital medicinal plants, animals and minerals. Indigenous individuals also have the right to access, without any discrimination, to all social and health services.

2. Indigenous individuals have an equal right to the enjoyment of the highest attainable standard of physical and mental health. States shall take the necessary steps with a view to achieving progressively the full realization of this right.

equal in quality, size and legal status or of monetary compensation or other appropriate redress.

Article 29

1. Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.

2. States shall take effective measures to ensure that no storage or disposal of hazardous materials shall take place in the lands or territories of indigenous peoples without their free, prior and informed consent.

3. States shall also take effective measures to ensure, as needed, that programmes for monitoring, maintaining and restoring the health of indigenous peoples, as developed and implemented by the peoples affected by such materials, are duly implemented.

Article 30

1. Military activities shall not take place in the lands or territories of indigenous peoples, unless justified by a relevant public interest or otherwise freely agreed with or requested by the indigenous peoples concerned.

2. States shall undertake effective consultations with the indigenous peoples concerned, through appropriate procedures and in particular through their representative institutions, prior to using their lands or territories for military activities.

Article 31

1. Indigenous peoples have the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions, as well as the manifestations of their sciences, technologies and cultures, including human and genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs, sports and traditional games and visual and performing arts. They also have the right to maintain, control, protect and develop their intellectual property over such cultural heritage, traditional knowledge, and traditional cultural expressions.

Article 25

Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard.

Article 26

1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired.

2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired.

3. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due respect to the customs, traditions and land tenure systems of the indigenous peoples concerned.

Article 27

States shall establish and implement, in conjunction with indigenous peoples concerned, a fair, independent, impartial, open and transparent process, giving due recognition to indigenous peoples' laws, traditions, customs and land tenure systems, to recognize and adjudicate the rights of indigenous peoples pertaining to their lands, territories and resources, including those which were traditionally owned or otherwise occupied or used. Indigenous peoples shall have the right to participate in this process.

Article 28

1. Indigenous peoples have the right to redress, by means that can include restitution or, when this is not possible, just, fair and equitable compensation, for the lands, territories and resources which they have traditionally owned or otherwise occupied or used, and which have been confiscated, taken, occupied, used or damaged without their free, prior and informed consent.

2. Unless otherwise freely agreed upon by the peoples concerned, compensation shall take the form of lands, territories and resources

2. In conjunction with indigenous peoples, States shall take effective measures to recognize and protect the exercise of these rights.

Article 32

1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.

2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

3. States shall provide effective mechanisms for just and fair redress for any such activities, and appropriate measures shall be taken to mitigate adverse environmental, economic, social, cultural or spiritual impact.

Article 33

1. Indigenous peoples have the right to determine their own identity or membership in accordance with their customs and traditions. This does not impair the right of indigenous individuals to obtain citizenship of the States in which they live.

2. Indigenous peoples have the right to determine the structures and to select the membership of their institutions in accordance with their own procedures.

Article 34

Indigenous peoples have the right to promote, develop and maintain their institutional structures and their distinctive customs, spirituality, traditions, procedures, practices and, in the cases where they exist, juridical systems or customs, in accordance with international human rights standards.

Article 35

Indigenous peoples have the right to determine the responsibilities of individuals to their communities.

Article 36

1. Indigenous peoples, in particular those divided by international borders, have the right to maintain and develop contacts, relations and cooperation, including activities for spiritual, cultural, political, economic and social purposes, with their own members as well as other peoples across borders.

2. States, in consultation and cooperation with indigenous peoples, shall take effective measures to facilitate the exercise and ensure the implementation of this right.

Article 37

1. Indigenous peoples have the right to the recognition, observance and enforcement of treaties, agreements and other constructive arrangements concluded with States or their successors and to have States honour and respect such treaties, agreements and other constructive arrangements.

2. Nothing in this Declaration may be interpreted as diminishing or eliminating the rights of indigenous peoples contained in treaties, agreements and other constructive arrangements.

Article 38

States, in consultation and cooperation with indigenous peoples, shall take the appropriate measures, including legislative measures, to achieve the ends of this Declaration.

Article 39

Indigenous peoples have the right to have access to financial and technical assistance from States and through international cooperation, for the enjoyment of the rights contained in this Declaration.

Article 40

Indigenous peoples have the right to access to and prompt decision through just and fair procedures for the resolution of conflicts and disputes with States or other parties, as well as to effective remedies for all infringements of their individual and collective rights. Such a decision shall give due consideration to the customs, traditions, rules and legal systems of the indigenous peoples concerned and international human rights.

Article 41

The organs and specialized agencies of the United Nations system and other intergovernmental organizations shall contribute to the full realization of the provisions of this Declaration through the mobilization, inter alia, of financial cooperation and technical assistance. Ways and means of ensuring participation of indigenous peoples on issues affecting them shall be established.

Article 42

The United Nations, its bodies, including the Permanent Forum on Indigenous Issues, and specialized agencies, including at the country level, and States shall promote respect for and full application of the provisions of this Declaration and follow up the effectiveness of this Declaration.

Article 43

The rights recognized herein constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world.

Article 44

All the rights and freedoms recognized herein are equally guaranteed to male and female indigenous individuals.

Article 45

Nothing in this Declaration may be construed as diminishing or extinguishing the rights indigenous peoples have now or may acquire in the future.

Article 46

1. Nothing in this Declaration may be interpreted as implying for any State, people, group or person any right to engage in any activity or to perform any act contrary to the Charter of the United Nations or construed as authorizing or encouraging any action which would dismember or impair, totally or in part, the territorial integrity or political unity of sovereign and independent States.

2. In the exercise of the rights enunciated in the present Declaration, human rights and fundamental freedoms of all shall be respected. The exercise of the rights set forth in this Declaration shall be subject only to such limitations as are determined by law

and in accordance with international human rights obligations. Any such limitations shall be non-discriminatory and strictly necessary solely for the purpose of securing due recognition and respect for the rights and freedoms of others and for meeting the just and most compelling requirements of a democratic society.

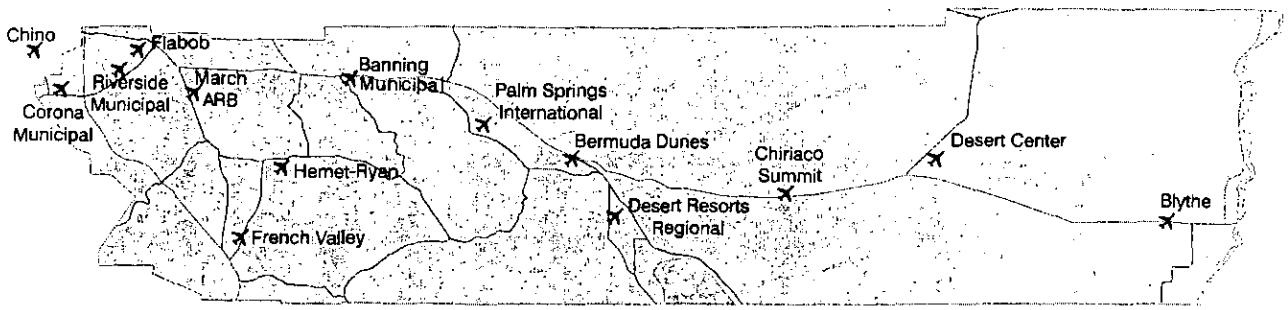
3. The provisions set forth in this Declaration shall be interpreted in accordance with the principles of justice, democracy, respect for human rights, equality, non-discrimination, good governance and good faith.

EXHIBIT 322

Riverside County Airport Land Use Compatibility Plan

Volume 1
Policy Document

October 14, 2004



Adopted
by
Riverside County Airport Land Use Commission

Riverside County Airport Land Use Compatibility Plan

Volume 1
Policy Document

October 14, 2004

Adopted
by
Riverside County Airport Land Use Commission

by

MEAD & HUNT

Santa Rosa, California

and

Coffman Associates
Kansas City, Missouri

Riverside County Airport Land Use Commission

Commissioners (2004)

- *County Representatives*
  Arthur M. Butler
  Mark Lightsey

- *Airport Managers' Representatives*
  Ric Stephens, Chairman
    June Stephens, Alternate
  Simon Housman

- *City Representatives*
  Sam Pratt, Temecula
    Dave Hogan, Alternate
  Marge Tandy, Hemet
    Robin Lowe, Alternate
    Lori Van Ardale, Alternate

- *At Large*
  Jon Goldenbaum
    Kathy Rohm, Alternate

Former Commissioners and Alternates (2002-2004)

Ed Adkison
Paul Bell
William Cobb
Allen Graff
Walt Snyder
Lyle Alberg, Alternate to Marge Tandy
Roger Meadows, Alternate to Marge Tandy

Staff

Keith Downs, Executive Director
Beverly Coleman, Development Specialist
B.T. Miller, Counsel

Consultants

Mead & Hunt, Inc.

Kenneth A. Brody, Project Manager
David P. Dietz, A.I.C.P., Senior Airport Planner
Maranda Thompson, Airport Planner
Todd Eroh, Graphics Technician
Susan Norvall, Publication Coordinator

Coffman Associates

David Fitz, A.I.C.P., Associate
Molly Moran Waller, Airport/Environmental Planner
Kory Lewis, Airport Planner

Table of Contents

Volume 1

VOLUME 1: POLICY DOCUMENT

Chapter 1 Introduction

Overview of the Plan 1–1
- General Applicability 1–1
- Statutory Requirements 1–3
- Riverside County Airport Land Use Commission 1–4
- Relationship of the ALUC to County and City Governments 1–5

Policy Framework 1–5
- State Laws and Guidelines 1–5
- Relationship to Airport Master Plans 1–6

Plan Implementation 1–6
- General Plan Consistency 1–6
- Project Referrals 1–8

Plan Contents 1–8

Tables
- 1A Compatibility Plan Adoption Status 1–2

Chapter 2 Countywide Policies

1. General Applicability 2–1
   - 1.1 Purpose 2–1
   - 1.2 Definitions 2–2
   - 1.3 Geographic Scope 2–3
   - 1.4 Types of Airport Impacts 2–4
   - 1.5 Types of Actions Reviewed 2–5
2. Review Process 2–8
   - 2.1 General 2–8
   - 2.2 Review Process for Community Land Use Plans and Ordinances 2–8
   - 2.3 Review Process for Major Land Use Actions 2–9
   - 2.4 Review Process for Airport Master Plans and Development Plans 2–11
3. Compatibility Criteria for Land Use Actions 2–13
   - 3.1 Basic Criteria 2–13
   - 3.2 General Plan Consistency with Compatibility Plan 2–17
   - 3.3 Special Conditions 2–18
4. Supporting Compatibility Criteria 2–21
   - 4.1 Noise 2–21
   - 4.2 Safety 2–24
   - 4.3 Airspace Protection 2–28
   - 4.4 Overflight 2–30

5. Compatibility Criteria for Airport Development Actions 2–32
5.1 Criteria for Master or Development Plans of Existing Airports 2–32
5.2 Criteria for Proposed New Airports or Heliports 2–33
Tables
2A Basic Compatibility Criteria 2–14
2B Supporting Compatibility Criteria: Noise 2–23

Chapter 3 Individual Airport Policies and Compatibility Maps
Chapter Overview 3–1
Tables
3A Compatibility Zone Factors 3–3
BN. Banning Municipal Airport
BN.1 Compatibility Map Delineation 3–4
BN.2 Additional Compatibility Policies 3–4
Maps
BN–1 Compatibility Map ..... ff 3–4
BN–2 Airspace Plan ..... ff 3–4
BN–3 Noise Compatibility Contours 3–5
BD. Bermuda Dunes Airport
BD.1 Compatibility Map Delineation 3–6
BD.2 Additional Compatibility Policies 3–6
Maps
BD–1 Compatibility Map ..... ff 3–6
BD–2 Airspace Plan ..... ff 3–6
BD–3 Noise Compatibility Contours 3–7
BL. Blythe Airport
BL.1 Compatibility Map Delineation 3–8
BL.2 Additional Compatibility Policies 3–8
Maps
BL–1 Compatibility Map ..... ff 3–8
BL–2 Airspace Plan ..... ff 3–8
BL–3 Noise Compatibility Contours 3–9
CH. Chino Airport
CH.1 Compatibility Map Delineation 3–10
CH.2 Additional Compatibility Policies 3–10
Maps
CH–1 Compatibility Map ..... ff 3–10
CH–2 Airspace Plan ..... ff 3–10
CH–3 Noise Compatibility Contours 3–11
CS. Chiriaco Summit Airport
CS.1 Compatibility Map Delineation 3–12
CS.2 Additional Compatibility Policies 3–12
Maps
CS–1 Compatibility Map ..... ff 3–12
CS–2 Airspace Plan ..... ff 3–12
CS–3 Noise Compatibility Contours 3–13

CO. Corona Municipal Airport
CO.1 Compatibility Map Delineation 3–14
CO.2 Additional Compatibility Policies 3–14
Maps
CO–1 Compatibility Map ..... ff 3–14
CO–2 Airspace Plan ..... ff 3–14
CO–3 Noise Compatibility Contours 3–15
DC. Desert Center Airport
DC.1 Compatibility Map Delineation 3–16
DC.2 Additional Compatibility Policies 3–16
Maps
DC–1 Compatibility Map ..... ff 3–16
DC–2 Airspace Plan ..... ff 3–16
DC–3 Noise Compatibility Contours 3–17
JC. Jacqueline Cochran Regional Airport
JC.1 Compatibility Map Delineation 3–18
JC.2 Additional Compatibility Policies 3–18
Maps
JC–1 Compatibility Map ..... ff 3–18
JC–2 Airspace Plan ..... ff 3–18
JC–3 Noise Compatibility Contours 3–19
FL. Flabob Airport
FL.1 Compatibility Map Delineation 3–20
FL.2 Additional Compatibility Policies 3–20
Maps
FL–1 Compatibility Map ..... ff 3–20
FL–2 Airspace Plan ..... ff 3–20
FL–3 Noise Compatibility Contours 3–21
FV. French Valley Airport
FV.1 Compatibility Map Delineation 3–22
FV.2 Additional Compatibility Policies 3–22
Maps
FV–1 Compatibility Map ..... ff 3–22
FV–2 Airspace Plan ..... ff 3–22
FV–3 Noise Compatibility Contours 3–23
HR. Hemet-Ryan Airport
HR.1 Compatibility Map Delineation 3–24
HR.2 Additional Compatibility Policies 3–24
Maps
HR–1 Compatibility Map ..... ff 3–24
HR–2 Airspace Plan ..... ff 3–24
HR–3 Noise Compatibility Contours 3–25

PS. Palm Springs International Airport
PS.1 Compatibility Map Delineation 3–26
PS.2 Additional Compatibility Policies 3–26
Maps
PS–1 Compatibility Map ..... ff 3–26
PS–2 Airspace Plan ..... ff 3–26
PS–3 Noise Compatibility Contours 3–27
RI. Riverside Municipal Airport
RI.1 Compatibility Map Delineation 3–28
RI.2 Additional Compatibility Policies 3–28
Maps
RI–1 Compatibility Map ..... ff 3–28
RI–2 Airspace Plan ..... ff 3–28
RI–3 Noise Compatibility Contours 3–29
MA. March Air Reserve Base *[to be added]*
MA.1 Compatibility Map Delineation 3–30
MA.2 Additional Compatibility Policies 3–30
Maps
MA–1 Compatibility Map ..... ff 3–30
MA–2 Airspace Plan ..... ff 3–31
MA–3 Noise Compatibility Contours 3–31

Appendices

A. State Laws Related to Airport Land Use Planning
B. Federal Aviation Regulations Part 77
C. Methods for Determining Concentrations of People
D. Compatibility Guidelines for Specific Land Uses
E. Project Referral Form
F. General Plan Consistency Checklist
G. Sample Implementation Documents
H. Airport Land Use Compatibility Concepts
I. Countywide Airspace Usage
J. Glossary

VOLUME 2: BACKGROUND DATA—WEST COUNTY AIRPORTS

Preface

Chapter W1 **Chino Airport**
Chapter W2 **Corona Municipal Airport**
Chapter W3 **Flabob Airport**
Chapter W4 **French Valley Airport**
Chapter W5 **Hemet-Ryan Airport**
Chapter W6 **Riverside Municipal Airport**
Chapter W7 **March Air Reserve Base** *[to be added]*

VOLUME 3: BACKGROUND DATA—EAST COUNTY AIRPORTS

Preface

Chapter E1 **Banning Municipal Airport**
Chapter E2 **Bermuda Dunes Airport**
Chapter E3 **Blythe Airport**
Chapter E4 **Chiriaco Summit Airport**
Chapter E5 **Desert Center Airport**
Chapter E6 **Jacqueline Cochran Regional Airport**
Chapter E7 **Palm Springs International Airport**

1

Introduction

Overview of the Plan

The basic function of airport land use compatibility plans is to promote compatibility between airports and the land uses that surround them. Compatibility plans serve as a tool for use by airport land use commissions in fulfilling their duty to review proposed development plans for airports and surrounding land uses. Additionally, compatibility plans set compatibility criteria applicable to local agencies in their preparation or amendment of land use plans and ordinances and to landowners (including special district and other local government entities as well as private parties) in their design of new development.

General Applicability

As adopted by the Riverside County Airport Land Use Commission (ALUC), this *Riverside County Airport Land Use Compatibility Plan Policy Document* establishes policies applicable to land use compatibility planning in the vicinity of airports throughout Riverside County. Included are compatibility criteria and maps for the influence areas of individual airports. Also spelled out in the plan are the procedural requirements associated with the compatibility review of development proposals.

This plan replaces compatibility plans for individual airports adopted by the ALUC at various times from 1974 through 1998. The specific airports covered by this document and the date when the present plan was adopted with respect to each airport are listed in Table 1A. If a new adoption date is not indicated in the table, the earlier compatibility plan remains in effect for that airport. As required by state law, either this plan or an earlier one has been adopted for all of the public-use and military airports in the county. Preparation of compatibility plans for private-use airports is at the option of the ALUC. Note that Chino Airport situated in San Bernardino County is among the airports included in Table 1A. This *Compatibility Plan* pertains only to the portion of that airport's influence area which extends into Riverside County.

Along with the airport names and plan adoption dates, Table 1A lists the names of the local government entities—the County of Riverside and/or cities within the county—whose jurisdictions extend into the adopted or potential influence area of the respective airport. The parts of each jurisdiction affected by the plan are depicted in the compatibility maps included in Chapter 3.

AIRPORT / OWNERSHIP	ADOPTION DATE	JURISDICTIONS AFFECTED*	
Public-Use Airports in Riverside County			
Banning Municipal City of Banning	October 14, 2004	City of Banning	County of Riverside
Bermuda Dunes Private	December 9, 2004	City of Indio City of La Quinta	City of Palm Desert County of Riverside
Blythe City/County of Riverside	October 14, 2004	City of Blythe	County of Riverside
Chiriaco Summit County of Riverside	October 14, 2004	County of Riverside	
Corona Municipal City of Corona	October 14, 2004	City of Corona City of Norco	County of Riverside
Desert Center County of Riverside	October 14, 2004	County of Riverside	
Jacqueline Cochran Regional *(formerly Desert Resorts Regional)* County of Riverside		City of Coachella	County of Riverside
Flabob Private	December 9, 2004	City of Riverside	County of Riverside
French Valley County of Riverside	December 9, 2004	City of Murrieta City of Temecula	County of Riverside
Hemet-Ryan County of Riverside		City of Hemet	County of Riverside
Palm Springs International City of Palm Springs	March 10, 2005	City of Palm Springs City of Cathedral City	City of Rancho Mirage
Riverside Municipal City of Riverside	March 10, 2005	City of Riverside	County of Riverside
Military Airports in Riverside County			
March Air Reserve Base U.S. Air Force		City of Moreno Valley City of Perris	City of Riverside County of Riverside March JPA
Private-Use Airports Riverside County			
Perris Valley Private		City of Perris	County of Riverside
Skylark Private		City of Lake Elsinore	County of Riverside
Public-Use Airports in Nearby Areas of Adjacent Counties			
Chino County of San Bernardino		County of Riverside	

* Riverside County jurisdictions within adopted airport influence area (approximately 2 miles of small general aviation airports or 3 miles of major general aviation, airline, and military airports); not listed, but also subject to this *Compatibility Plan*, are any special districts or school districts within an airport influence area.

Table 1A

Compatibility Plan Adoption Status

Additional details regarding the purpose, scope, and applicability of the *Compatibility Plan* are set forth in the countywide policies chapter that follows.

Statutory Requirements

Powers and Duties

Requirements for creation of airport land use commissions (ALUCs) were first established under the California State Aeronautics Act (Public Utility Code Sections 21670 et seq.) in 1967. (See Appendix A herein for a copy of the statutes). Although the law has been amended numerous times since then, the fundamental purpose of ALUCs to promote land use compatibility around airports has remained unchanged. As expressed in the present statutes, this purpose is:

> "...to protect public health, safety, and welfare by ensuring the orderly expansion of airports and the adoption of land use measures that minimize the public's exposure to excessive noise and safety hazards within areas around public airports to the extent that these areas are not already devoted to incompatible uses."

The statutes give ALUCs two principal powers by which to accomplish this objective. First, ALUCs must prepare and adopt an airport land use compatibility plan. Secondly, they must review the plans, regulations, and other actions of local agencies and airport operators for consistency with that plan.

Limitations

This fundamental objective notwithstanding, airport land use commissions are limited in their powers to achieve it. Two limitations are explicitly written into the law: ALUCs have no authority over either existing land uses (Section 21674(a)) or the operation of airports (Section 21674(e)). Neither of these terms is defined within the statutes, but the interpretation of their meaning is fairly standard throughout the state.

- **Existing Land Uses**—The precise wording of the Aeronautics Act is that the authority of ALUCs extends only to land in the vicinity of airports that is "not already devoted to incompatible uses." The working interpretation of this language is that ALUCs have no state-empowered authority over existing land uses. The question then becomes one of determining what conditions qualify a land use as existing.

  For airport land use planning purposes, a land use can generally be considered existing once the local agency has completed all discretionary actions on the project and only ministerial approvals remain. A vacant property thus can be considered "devoted to" a particular use, even if the activity has not begun, once local government commitments along with substantial construction investments by the property owner make it infeasible for the property to be used for anything other than its proposed use. Local government commitment to a proposal can usually be considered firm once a vesting tentative map, development agreement, or other land use entitlement has been approved. (See Chapter 2 for the definition of *existing land use* as adopted by the Riverside County Airport Land Use Commission).

- **Operation of Airports**—Any actions pertaining to how and where aircraft operate on the ground or in the air around an airport are clearly not within the jurisdiction of ALUCs to regulate. ALUC involvement with aircraft operations is limited to taking the operational characteristics into account in the development of land use compatibility plans. This limitation on the jurisdiction of ALUCs can-

not, however, be taken to mean that they have no authority with respect to new development on airport property. For example, the law specifically requires ALUCs to review proposed airport master plans for consistency with the commission's plans. ALUCs also have authority to review proposals for nonaviation development on airport property.

A third, less absolute, limitation concerns the types of land use actions that are subject to ALUC review. The law emphasizes local general plans as the primary mechanism for implementing the compatibility policies set forth in an ALUC's plan. Thus, Riverside County and each city affected by an airport land use compatibility plan is required to make its general plan consistent with the ALUC plan (or to overrule the commission). Once a local agency has taken this action to the satisfaction of the Airport Land Use Commission, the ALUC's authority to review projects within that jurisdiction is narrowly limited. The only actions for which review remains mandatory are proposed adoption or amendment of general plans, specific plans, zoning ordinances, and building regulations affecting land within an airport influence area. For an ALUC to review individual projects, the local agency must agree to submit them.

One final limitation worth noting is that ALUCs have no jurisdiction over federal lands such as lands controlled by the U.S. Forest Service, Bureau of Land Management, or Indian tribes. ALUCs can merely inform these agencies about the ALUC policies and seek their cooperation.

Riverside County Airport Land Use Commission

State law provides two basic options regarding the structure of airport land use commissions: a standard format or designation of an existing body to serve as the ALUC. Among California's 58 counties, these two formats are used in roughly equal proportions.

Membership on ALUCs structured in the standard manner is specified to be as follows:

- Two members appointed by the county board of supervisors;
- Two members appointed by a selection committee of mayors of the county's cities;
- Two members appointed by airport managers; and
- A seventh member, representing the general public, appointed by the other six.

The designated body format has several possibilities. Most common is for a single- or multi-county council of governments or similar entity to be designated as the ALUC. Other types of bodies that serve as ALUCs in some counties include the county planning commission, the county airport commission, or the county board of supervisors.

The Riverside County Airport Land Use Commission first met in 1971 with the Riverside County Airport Commission designated to serve the ALUC function. Two city representatives were later added, then, beginning in 1998, the Commission assumed the standard format that continues today. The county agency assigned to provide support staff to the ALUC has also varied over the years. Since 1998, this responsibility has rested with the Riverside County Economic Development Agency (EDA). This agency also functions as management for the county-owned airports. A member of the EDA staff serves as the ALUC Executive Director.

Relationship of the ALUC to County and City Governments

The fundamental relationship between the Riverside County Airport Land Use Commission and the governments of Riverside County and the affected cities in the county is set by the State Aeronautics Act. The ALUC is not simply an advisory body for the Riverside County Board of Supervisors or city councils in the manner that their respective planning commissions are. Rather, it is more equivalent to a Local Agency Formation Commission (LAFCo). Within the bounds defined by state law, the decisions of the ALUC are final and are independent of the Board or city councils. The ALUC does not need county or city approval in order to adopt this *Compatibility Plan* or to carry out ALUC land use project review responsibilities.

Another aspect of the relationship between the ALUC and county and city governments concerns implementation of the *Compatibility Plan.* As noted earlier, although the ALUC has the sole authority to adopt this plan and to conduct compatibility reviews, the authority and responsibility for implementing the compatibility policies rests with the local governments. Actions that Riverside County and the affected cities can take to implement the *Compatibility Plan* are outlined later in this chapter.

POLICY FRAMEWORK

The policies in Chapter 2 and 3 of this *Compatibility Plan Policies Document* are based upon two primary sources: state laws and guidelines; and master plans for the respective airports.

State Laws and Guidelines

Many of the procedures that govern how ALUCs operate are defined by state law. Statutory provisions in the Public Utilities Code establish the requirements for ALUC adoption of compatibility plans, including which airports should or can be included and some of the steps involved in the plan adoption. The law also dictates the requirements for airport land use compatibility reviews by the ALUC. The types of actions that local jurisdictions must submit for review are specified, for example.

With respect to airport land use compatibility criteria, the statutes say little, however. Instead, a section of the law enacted in 1994 refers to another document, the *Airport Land Use Planning Handbook* published by the California Division of Aeronautics. Specifically, the statutes say that, when preparing compatibility plans for individual airports, ALUCs shall "be guided by" the information contained in the *Handbook*. The *Handbook* is not regulatory in nature, however, and it does not constitute formal state policy except to the extent that it explicitly refers to state laws. Rather, its guidance is intended to serve as the starting point for compatibility planning around individual airports. The policies in this *Compatibility Plan*, including the individual airport compatibility maps, take into account the guidance provided by the current edition of the *Airport Land Use Planning Handbook*, dated January 2002.

An additional function of the *Airport Land Use Planning Handbook* is established elsewhere in California state law. The Public Resources Code creates a tie between the *Handbook* and California Environmental Quality Act (CEQA) documents. Specifically, Section 21096 requires that lead agencies must use the *Handbook* as "a technical resource" when assessing airport-related noise and safety impacts of projects located in the vicinity of airports.

The most recent edition of the *Handbook* was completed in January 2002 and is available for downloading from the Division of Aeronautics web site (www.dot.ca.gov/hq/planning/aeronaut).

Relationship to Airport Master Plans

Airport land use compatibility plans are distinct from airport master plans in function and content. In simple terms, the issues addressed by airport master plans are primarily on-airport whereas those of concern in a compatibility plan are mostly off-airport. The purpose of airport master plans is to assess the demand for airport facilities and to guide the development necessary to meet those demands. An airport master plan is prepared for and adopted by the agency that owns and/or operates the airport. In contrast, the major purpose of a compatibility plan is to ensure that incompatible development does not occur on lands surrounding the airports. The responsibility for preparation and adoption of compatibility plans lies with each county's airport land use commission.

This distinction notwithstanding, the relationship between the two types of plans is close. Specifically, Public Utilities Code Section 21675(a) requires that ALUC plans be based upon a long-range airport master plan adopted by the airport owner/proprietor. If such a plan does not exist for a particular airport, an airport layout plan may be used subject to approval by the California Division of Aeronautics.

The compatibility plan for each of the airports within the jurisdiction of the Riverside County Airport Land Use Commission is based upon the respective airport master plan or, as allowed by the statutes, a state-approved airport layout plan. The status of the master plan and layout plan for each airport is indicated in the background data volumes of this *Compatibility Plan*.

PLAN IMPLEMENTATION

General Plan Consistency

As noted above, state law requires each local agency having jurisdiction over land uses within an ALUC's planning area to modify its general plan and any affected specific plans to be consistent with the compatibility plan. The law says that the local agency must take this action within 180 days of when the ALUC adopts or amends its plan. The only other course of action available to local agencies is to overrule the ALUC by a two-thirds vote of its governing body after making findings that the agency's plans are consistent with the intent of state airport land use planning statutes. Additionally, the local agency must notify both the ALUC and the California Division of Aeronautics at least 45 days in advance of its decision to overrule and must hold a public hearing on the proposed overruling (Public Utilities Code Section 21676(a) and (b)). Note that similar requirements apply to local agency overruling of ALUC actions concerning individual development proposals for which ALUC review is mandatory (Section 21676.5(a)) and airport master plans (Section 21676(c)).

A general plan does not need to be identical with the ALUC plan in order to be consistent with it. To meet the consistency test, a general plan must do two things:

- It must specifically address compatibility planning issues, either directly or through reference to a zoning ordinance or other policy document; and
- It must avoid direct conflicts with compatibility planning criteria.

Many community general plans pay little attention to the noise and safety factors associated with airport land use compatibility. Also, some of the designated land uses of property near an airport frequently are contrary to good compatibility planning. It is anticipated that each of the land use jurisdictions

affected by this *Compatibility Plan* will need to make some modification to its general plan and/or other land use policy documents in order to meet the plan consistency requirements.

[An initial assessment of the consistency between the current local general plans and the compatibility criteria and other policies set forth in this ALUC *Compatibility Plan* is contained in the background data chapter for each airport.]

Compatibility planning issues can be reflected in a general plan in several ways:

- **Incorporate Policies into Existing General Plan Elements**—One method of achieving the necessary planning consistency is to modify existing general plan elements. For example, airport land use noise policies could be inserted into the noise element, safety policies could be placed into a safety element, and the primary compatibility criteria and associated maps plus the procedural policies might fit into the land use element. With this approach, direct conflicts would be eliminated and the majority of the mechanisms and procedures necessary to ensure compliance with compatibility criteria could be fully incorporated into a local jurisdiction's general plan.

- **Adopt a General Plan Airport Element**—Another approach is to prepare a separate airport element of the general plan. Such a format may be advantageous when a community's general plan also needs to address on-airport development and operational issues. Modification of other plan elements to provide cross-referencing and eliminate conflicts would still be necessary.

- **Adopt Compatibility Plan as Stand-Alone Document**—Jurisdictions selecting this option would simply adopt as a local policy document the relevant portions of the *Compatibility Plan Policy Document*—specifically, Chapter 2 plus the policies and maps for the relevant airports from Chapter 3. Applicable background information from Volumes 2 and 3 could be included as well if desired. Changes to the community's existing general plan would be minimal. Policy reference to the ALUC plan would need to be added and any direct land use or other conflicts with compatibility planning criteria would have to be removed. Limited discussion of compatibility planning issues could be included in the general plan, but the substance of most compatibility policies would appear only in the stand-alone document.

- **Adopt Airport Combining District or Overlay Zoning Ordinance**—This approach is similar to the stand-alone document except that the local jurisdiction would not explicitly adopt the *Compatibility Plan* as policy. Instead, the compatibility policies would be restructured as an airport combining or overlay zoning ordinance. A combining zone serves as an overlay of standard community-wide land use zones and modifies or limits the uses permitted by the underlying zone. Flood hazard combining zoning is a common example. An airport combining zone ordinance can serve as a convenient means of bringing various airport compatibility criteria into one place. The airport-related height-limit zoning that many jurisdictions have adopted as a means of protecting airport airspace is a form of combining district zoning. Noise and safety compatibility criteria, together with procedural policies, would need to be added to create a complete airport compatibility zoning ordinance. Other than where direct conflicts need to be eliminated from the local plans, implementation of the compatibility policies would be accomplished solely through the zoning ordinance. Policy reference to airport compatibility in the general plan could be as simple as mentioning support for the airport land use commission and stating that policy implementation is by means of the combining zone. (An outline of topics which could be addressed in an airport combining zone is included in Appendix G.)

Project Referrals

In addition to the types of land use actions for which referral to the ALUC is mandatory in accordance with state law, the *Compatibility Plan* specifies other land use projects that either must or should be submitted for review. These *major land use actions* are defined in Chapter 2. Beginning with when this plan, as it pertains to each specific airport, is adopted by the Airport Land Use Commission and continuing until such time as local jurisdictions have made the necessary modifications to their general plans, all of these major land use actions are to be submitted to the commission for review. After local agencies have made their general plans consistent with the *Compatibility Plan*, the ALUC requests that these major actions continue to be submitted on a voluntary basis.

PLAN CONTENTS

The *Riverside County Airport Land Use Compatibility Plan* is organized into three volumes.

This first volume contains the policies by which the ALUC operates and conducts compatibility reviews of proposed land use and airport development actions. The present introductory chapter serves to set the overall context of airport land use compatibility planning in general and for airports in Riverside County in particular. The most important components of the plan are found in Chapters 2 and 3. Chapter 2 outlines the policies, including airport land use compatibility criteria, applicable around all airports in the county. Additionally, the policies define the types of actions to be submitted for ALUC review and the procedures that the ALUC will follow in making compatibility determinations. Chapter 3 presents the compatibility maps for each airport together with any policies applicable only to that airport. Also included in this volume are a set of appendices containing a copy of state statutes concerning airport land use commissions and other general information pertaining to airport land use compatibility planning.

Volumes 2 and 3 present various background data regarding each airport and its environs. Data for airports in western Riverside County is included in Volume 2; data regarding eastern county airports is found in Volume 3. In addition to serving as a convenient information reference for each airport, the material in Volumes 2 and 3 serves to document the data and assumptions upon which the compatibility map for each airport was based.

2

Countywide Policies

1. General Applicability

1.1. Purpose

The purpose of this *Riverside County Airport Land Use Compatibility Plan* is to articulate procedures and criteria, established in accordance with the California State Aeronautics Act (Public Utilities Code Section 21670 et seq.), that:

1.1.1. *Riverside County Airport Land Use Commission (ALUC):* The ALUC:

(a) Shall utilize when reviewing proposed land use development in Riverside County for compatibility with airport activity.

(b) Shall utilize when evaluating certain types of airport development proposals that also are subject to ALUC review and are addressed by the *Compatibility Plan.*

1.1.2. *County of Riverside and Affected Cities in the County:* The county and cities:

(a) Shall each apply when modifying their respective general plans and zoning ordinances to be consistent with the Commission's *Compatibility Plan.*

(b) Shall consider when making other planning decisions regarding the proposed development of lands impacted by airport operations.

(c) Shall use as the basis for referring specified land use proposals to the Riverside County ALUC for review.

1.1.3. *Special Districts and School Districts:* Special districts and school districts:

(a) Shall apply when creating plans and making other planning decisions regarding proposed facilities and other development affecting or affected by airport operations.

(b) Shall use as the basis for referring specified land use proposals to the Riverside County ALUC for review.

1.1.4. *County of San Bernardino:* The county of San Bernardino should recognize as the basis for coordination with the Riverside County ALUC and the county of Riverside regarding airport impacts, specifically with regard to Chino Airport, that overlap the common boundary between the counties.

1.2. Definitions

The following definitions apply for the purposes of the policies set forth in this document (additional terms are defined in the *Glossary*):

1.2.1. *Aeronautics Act:* Except as indicated otherwise, the article of the California Public Utilities Code (Sections 21670 et seq.) pertaining to airport land use commissions.

1.2.2. *Airport:* Each of the public-use or military airports, as listed in Policy 1.3.1(a), situated within or affecting lands within Riverside County, or any other new public-use airport which might be created within the boundaries of Riverside County.

1.2.3. *Airport Influence Area:* An area, as delineated in Chapter 3 herein, in which current or future airport-related noise, overflight, safety, or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses. The *airport influence area* constitutes the area within which certain land use actions are subject to ALUC review. The term *airport influence area* is synonymous with the term *airport referral area* as well as to the term *planning area* as referred to in Public Utilities Code Section 21675.

1.2.4. *Airport Land Use Commission (ALUC):* The Riverside County Airport Land Use Commission.

1.2.5. *Aviation-Related Use:* Any facility or activity directly associated with the air transportation of persons or cargo or the operation, storage, or maintenance of aircraft at an airport or heliport. Such uses specifically include runways, taxiways, and their associated protection areas defined by the Federal Aviation Administration, together with aircraft aprons, hangars, fixed base operations facilities, terminal buildings, etc.

1.2.6. *Avigation Easement:* An easement that conveys rights associated with aircraft overflight of a property, including creation of noise, limits on the height of structures and trees, etc. (see *Glossary*)

1.2.7. *Community Noise Equivalent Level (CNEL):* The noise metric adopted by the state of California for describing airport noise impacts. The noise impacts are typically depicted by a set of contours, each of which represents points having the same CNEL value.

1.2.8. *Compatibility Plan:* This document, the *Riverside County Airport Land Use Compatibility Plan.*

1.2.9. *Compatibility Zone:* Any of the zones set forth herein for the purposes of assessing land use compatibility within the airport influence area.

1.2.10. *Existing Land Use:* A land use that either physically exists or for which local government commitments to the proposal have been obtained; that is, no further discretionary approvals are necessary. Local government commitment to a proposal can usually be considered firm once one or more of the following have occurred:

(a) A tentative parcel or subdivision map has been approved and not expired;

(b) A vesting tentative parcel or subdivision map has been approved;

(c) A development agreement has been approved and remains in effect;

(d) A final subdivision map has been recorded;

(e) A use permit or other discretionary entitlement has been approved and not yet expired; or

(f) A valid building permit has been issued.

1.2.11. *Federal Aviation Regulations (FAR) Part 77:* The part of Federal Aviation Regulations which deals with objects affecting navigable airspace in the vicinity of airports. Objects which exceed the Part 77 height limits constitute airspace obstructions.

1.2.12. *Gross Acreage:* Gross acreage includes the property at issue plus a share of adjacent roads and any adjacent, permanently dedicated, open lands.

1.2.13. *Height Review Overlay Zone:* Areas of land in the vicinity of an airport where the ground lies above an FAR 77 surface or less than 35 feet beneath such surface.

1.2.14. *Heliport:* A helicopter landing facility for which a Heliport Permit is required from the California Department of Transportation. Public-use and special-use heliports (including those at hospitals) are included within this definition, but helipads located on an airport are excluded. Personal-use heliports may or may not require a state permit depending upon their location and other factors.

1.2.15. *Infill:* Development of vacant or underutilized land within areas that are already largely developed or used more intensively. See Policy 3.3.1(a) for criteria used to identify infill areas for compatibility planning purposes.

1.2.16. *Local Jurisdiction:* The County of Riverside or any city or other government agency (except state or federal government agencies or Indian tribes) having jurisdiction over land uses within their boundaries.

1.2.17. *Major Land Use Action:* Actions related to proposed land uses for which compatibility with airport activity is a particular concern, but for which ALUC review is not always mandatory under state law. These types of actions are listed in Policy 1.5.3.

1.2.18. *Nonconforming Use:* In general, a land use, parcel, or building which does not comply with a current land use plan or zoning ordinance, but which was legally permitted at the time the plan or ordinance was adopted. For the purposes of this *Compatibility Plan*, a nonconforming land use is one which exists (see definition of "existing land use" in Policy 1.2.10) as of the plan's adoption date, but which does not conform with the compatibility criteria set forth herein.

1.2.19. *Project; Land Use Action; Development Proposal:* Terms similar in meaning and all referring to the types of land use matters, either publicly or privately sponsored, which are subject to the provisions of this *Compatibility Plan.*

1.3. Geographic Scope

As established by the Riverside County Airport Land Use Commission, the geographic scope of the *Riverside County Airport Land Use Compatibility Plan* encompasses:

1.3.1. *Airport Influence Area*

(a) All lands on which the uses could be negatively affected by present or future aircraft operations at any of the airports listed in Table 1A for which the ALUC has specifically adopted these procedures; also those lands on which the uses could negatively affect any of the same airports.

(b) All lands within Riverside County that could be negatively affected by present or future aircraft operations at Chino Airport situated in San Bernardino County as well as lands in Riverside County on which the uses could negatively affect usage of that airport.

(c) The specific limits of the influence area for each of the above airports are depicted on the respective *Compatibility Map* for that airport as presented in Chapter 3.

1.3.2. *Countywide Impacts on Flight Safety:* Other lands, regardless of their location in the county, on which certain land use characteristics could adversely affect the safety of aircraft flight in Riverside County. The specific uses of concern are identified in Policy 1.5.2(c).

1.3.3. *New Airports:* The site and environs of any new airport that may be proposed anywhere in the county, including within incorporated cities, and that requires an Airport Permit from the California Department of Transportation (agricultural airports, personal-use airports, and seaplane landing sites are generally exempt from state permit requirements).

1.3.4. *Heliports:* The site and environs of any public-use or special-use heliport (as defined by the California Department of Transportation) that may exist or be proposed anywhere within Riverside County, including within incorporated cities.

1.4. Types of Airport Impacts

1.4.1. *Principal Compatibility Concerns:* The Commission is concerned only with the potential impacts related to:

(a) Exposure to aircraft noise;

(b) Land use safety with respect both to people on the ground and the occupants of aircraft;

(c) Protection of airport airspace; and

(d) General concerns related to aircraft overflights.

1.4.2. *Airport Impacts Not Considered:* Other impacts sometimes created by airports (e.g., air pollution, automobile traffic, etc.) are not addressed by these compatibility policies and are not subject to review by the Airport Land Use Commission. Also, in accordance with state law (Public Utilities Code Section 21674(e)), neither this *Plan* nor the

ALUC have authority over the operation of any airport (including where and when aircraft fly, airport security, and other such matters).

1.5. Types of Actions Reviewed

1.5.1. *Actions Which Always Require ALUC Review:* As required by state law, the following types of actions shall be referred to the Airport Land Use Commission for determination of consistency with the Commission's *Plan* prior to their approval by the local jurisdiction:

(a) The adoption or approval of any amendment to a general or specific plan affecting the property within an airport influence area (Public Utilities Code Section 21676(b)).

(b) The adoption or approval of a zoning ordinance or building regulation which (1) affects property within an airport influence area, and (2) involves the types of airport impact concerns listed in Section 1.4 (Public Utilities Code Section 21676(b)).

(c) Adoption or modification of the master plan for an existing public-use airport (Public Utilities Code Section 21676(c)).

(d) Any proposal for expansion of an existing airport or heliport if such expansion will require an amended airport permit from the state of California (Public Utilities Code Section 21664.5).

(e) Any proposal for a new airport or heliport whether for public use or private use (Public Utilities Code Section 21661.5) if the facility requires a state airport permit.

1.5.2. *Other Land Use Actions Subject to ALUC Review:* In addition to the above types of land use actions for which ALUC review is mandatory, other types of land use actions are subject to review under the following circumstances:

(a) Until such time as (1) the Commission finds that a local agency's general plan or specific plan is consistent with the *Airport Land Use Compatibility Plan*, or (2) the local agency has overruled the Commission's determination of inconsistency, state law provides that the ALUC may require the local agency to refer all actions, regulations, and permits involving land within an airport influence area to the Commission for review (Public Utilities Code Section 21676.5(a)). Only those actions that the ALUC elects not to review are exempt from this requirement. Commission policy is that only the *major land use actions* listed in Policy 1.5.3 shall be submitted for review.

(b) After a local agency has revised its general plan or specific plan (see Section 3.2) or has overruled the Commission, the Commission no longer has authority under state law to require that all actions, regulations, and permits be referred for review. However, the Commission and the local agency can agree that the Commission should continue to review individual projects in an advisory capacity.

(1) The Commission requests local agencies to continue to submit *major land use actions* as listed in Policy 1.5.3. ALUC review of these types of projects can serve to enhance their compatibility with airport activity.

(2) Review of these actions is requested only if a review has not previously been conducted as part of a general plan, specific plan, or zoning ordinance action or if sufficient project-level detail to enable a full assessment of compatibility was not available at the time of a previous review.

(3) Because the ALUC acts in an advisory capacity when reviewing projects under these circumstances, local jurisdictions are not required to adhere to the overruling process if they elect to approve a project without incorporating design changes or conditions suggested by the Commission.

(c) Proposed redevelopment of a property for which the existing use is consistent with the general plan and/or specific plan, but nonconforming with the compatibility criteria set forth in this plan, shall be subject to ALUC review. This policy is intended to address circumstances that arise when a general or specific plan land use designation does not conform to ALUC compatibility criteria, but is deemed consistent with the compatibility plan because the designation reflects an existing land use. Proposed redevelopment of such lands voids the consistency status and is to be treated as new development subject to ALUC review even if the proposed use is consistent with the local general plan or specific plan. (Also see Policies 3.3.2 and 3.3.3.)

(d) Proposed land use actions covered by Paragraphs (a), (b), and (c) above shall initially be reviewed by the ALUC Executive Director. If the Executive Director determines that significant compatibility issues are evident, the proposal shall be forwarded to the Commission for review and decision. The Commission authorizes the Executive Director to approve proposed actions having no apparent compatibility issues of significance.

1.5.3. *Major Land Use Actions:* The scope or character of certain *major land use actions,* as listed below, is such that their compatibility with airport activity is a potential concern. Even though these actions may be basically consistent with the local general plan or specific plan, sufficient detail may not be known to enable a full airport compatibility evaluation at the time that the general plan or specific plan is reviewed. To enable better assessment of compliance with the compatibility criteria set forth herein, ALUC review of these actions may be warranted. The circumstances under which ALUC review of these actions is to be conducted are indicated in Policy 1.5.2 above.

(a) Actions affecting land uses within any compatibility zone.

(1) Any proposed expansion of the sphere of influence of a city or special district.

(2) Proposed pre-zoning associated with future annexation of land to a city.

(3) Proposed development agreements or amendments to such agreements.

(4) Proposed residential development, including land divisions, consisting of five or more dwelling units or lots.

(5) Any discretionary development proposal for projects having a building floor area of 20,000 square feet or greater unless only ministerial approval (e.g., a building permit) is required.

(6) Major capital improvements (e.g., water, sewer, or roads) which would promote urban uses in undeveloped or agricultural areas to the extent that such uses are not reflected in a previously reviewed general plan or specific plan.

(7) Proposed land acquisition by a government entity for any facility accommodating a congregation of people (for example, a school or hospital).

(8) Any off-airport, nonaviation use of land within *Compatibility Zone A* of any airport.

(9) Proposals for new development (including buildings, antennas, and other structures) having a height of more than:

- 35 feet within *Compatibility Zone B1*, *B2*, or a *Height Review Overlay Zone*;
- 70 feet within *Compatibility Zone C*; or
- 150 feet within *Compatibility Zone D* or *E*.

(10) Any obstruction reviewed by the Federal Aviation Administration in accordance with Part 77 of the Federal Aviation Regulations that receives a finding of anything other than "not a hazard to air navigation."

(11) Any project having the potential to create electrical or visual hazards to aircraft in flight, including:

- Electrical interference with radio communications or navigational signals;
- Lighting which could be mistaken for airport lighting;
- Glare in the eyes of pilots of aircraft using the airport; and
- Impaired visibility near the airport.

(12) Projects having the potential to cause attraction of birds or other wildlife that can be hazardous to aircraft operations to be increased within the vicinity of an airport.

(b) Proposed nonaviation development of airport property if such development has not previously been included in an airport master plan or community general plan reviewed by the Commission. (See Policy 1.2.5 for definition of *aviation-related use.*)

(c) Regardless of location within Riverside County, any proposal for construction or alteration of a structure (including antennas) taller than 200 feet above the ground level at the site. (Such structures also require notification to the Federal Aviation Administration in accordance with Federal Aviation Regulations, Part 77, Paragraph 77.13(a)(1).)

(d) Any other proposed land use action, as determined by the local planning agency, involving a question of compatibility with airport activities.

1.5.4. *Intercounty Coordination:* Where an airport influence area crosses the Riverside County line, affected jurisdictions outside Riverside County are asked to maintain coordination with the Riverside County ALUC on airport land use compatibility issues. In particular:

(a) The County of San Bernardino should inform the Riverside County ALUC regarding proposed plans for development of Chino Airport that may change the character or magnitude of impacts within the Riverside County portion of the airport influence area. (See map in Chapter 3).

(b) Any other county adjacent to Riverside County or any city or other agency within such counties that may be considering proposed establishment or expansion of an airport within three miles (or heliport within one mile) of the Riverside County boundary should inform the Riverside County ALUC of such proposal.

(c) Riverside County ALUC review of such actions is advisory only. The ALUC has no jurisdiction over development outside Riverside County boundaries.

2. REVIEW PROCESS

2.1. General

2.1.1. *Timing of Project Submittal:* Proposed actions listed in Section 1.5 *should* be submitted to the Commission at the earliest reasonable point in time so that the Commission's (or ALUC Executive Director's) review can be duly considered by the local jurisdiction prior to formalizing its actions. The timing may vary depending upon the nature of the specific project. However, all projects *must* be submitted to the Commission for review prior to final approval by the local government entity.

2.1.2. *Public Input:* Where applicable, the Commission shall provide public notice and obtain public input in accordance with Public Utilities Code Section 21675.2(d) before acting on any plan, regulation, or other land use proposal under consideration.

2.2. Review Process for Community Land Use Plans and Ordinances

2.2.1. *Initial ALUC Review of General Plan Consistency:* In conjunction with adoption or amendment of this *Airport Land Use Compatibility Plan*, the Commission shall review the general plans and specific plans of affected local jurisdictions to determine their consistency with the Commission's policies.

(a) Within 180 days of the Commission's adoption or amendment of the *Airport Land Use Compatibility Plan*, each local agency must amend its general plan and any applicable specific plan to be consistent with the Commission's *Plan* or, alternatively, adopt findings and overrule the Commission in accordance with Public Utilities Code Section 21676(b) (Government Code Section 65302.3).

(b) Prior to taking action on a proposed amendment, the local agency must submit a draft of the proposal to the Commission for review and approval.

(c) In conjunction with its submittal of a general plan or specific plan amendment to the ALUC, a local agency may request that the Commission modify the areas defined as "infill" in accordance with Policy 3.3.1. The Commission will include a determination on the infill as part of its action on the consistency of the general plan and specific plans.

2.2.2. *Subsequent Reviews of Related Land Use Development Proposals:* As indicated in Policies 1.5.1(a) and 1.5.1(b), prior to taking action on an amendment of a general plan or specific plan or the addition or approval of a zoning ordinance or building regulation affecting an airport influence area as defined herein, local agencies must submit the proposed plan, ordinance, or regulation to the Commission for review. Subsequent land use development actions that are consistent with applicable, previously re-

viewed, local plans, ordinances, and regulations are subject to Commission review only under the conditions indicated in Policies 1.5.2 and 2.3.5.

2.2.3. *Commission Action Choices:* When reviewing a general plan, specific plan, zoning ordinance, or building regulation for consistency with the *Compatibility Plan*, the Airport Land Use Commission has three choices of action:

(a) Find the plan, ordinance, or regulation consistent with the *Compatibility Plan.* To make such a finding with regard to a general plan, the conditions identified in Section 3.2 must be met.

(b) Find the plan, ordinance, or regulation consistent with the *Compatibility Plan*, subject to conditions and/or modifications that the Commission may require. Any such conditions should be limited in scope and described in a manner that allows compliance to be clearly assessed.

(c) Find the plan, ordinance, or regulation inconsistent with the *Compatibility Plan.* In making a finding of inconsistency, the Commission shall note the specific conflicts or shortcomings upon which its determination is based.

2.2.4. *Response Time:* The Airport Land Use Commission must respond to a local agency's request for a consistency determination on a general plan, specific plan, zoning ordinance, or building regulation within 60 days from the date of referral (Public Utilities Code Section 21676(d)).

(a) The 60-day review period may be extended if agreed upon in writing by the submitting agency or project applicant.

(b) The date of referral is deemed to be the date on which all applicable project submittal information is received by the Commission Executive Director.

(c) If the Commission fails to make a determination within that period, the proposed action shall be deemed consistent with the *Compatibility Plan.*

(d) Regardless of Commission action or failure to act, the proposed action must comply with other applicable local, state, and federal regulations and laws.

(e) The referring agency shall be notified of the Commission's action in writing.

2.2.5. *ALUC Response to Notification of Proposed Overruling:* If a local agency proposes to overrule an ALUC action regarding a community land use plan or ordinance, it must provide 45 days notice to both the ALUC and the California Division of Aeronautics and these agencies then have 30 days in which to respond (Public Utilities Code Sections 21676(a) and (b)). The ALUC authorizes the Executive Director to respond as appropriate.

2.3. Review Process for Major Land Use Actions

2.3.1. *Project Submittal Information:* A proposed major land use action submitted to the Commission (or to the ALUC Executive Director) for review shall include:

(a) The following information:

(1) Property location data (assessor's parcel number, street address, subdivision lot number).

(2) An accurately scaled map showing the relationship of the project site to the airport boundary and runways.

(3) A description of the existing and proposed uses of the land in question.

(4) The type of land use action being sought from the local jurisdiction (e.g., zoning change, building permit, etc.).

(5) For residential uses, an indication of the potential or proposed number of dwelling units per acre (including any secondary units on a parcel); or, for nonresidential uses, the number of people potentially occupying the total site or portions thereof at any one time.

(6) If applicable, a detailed site plan showing ground elevations, the location of structures, open spaces, and water bodies, and the heights of structures and trees.

(7) Identification of any characteristics which could create electrical interference, confusing lights, glare, smoke, or other electrical or visual hazards to aircraft flight.

(8) Any environmental document (initial study, draft environmental impact report, etc.) that may have been prepared for the project.

(9) Any staff reports regarding the project that may have been presented to local agency decision makers.

(10) Other relevant information which the Commission or its staff determine to be necessary to enable a comprehensive review of the proposal.

(b) Any applicable review fees as established by the Riverside County Airport Land Use Commission.

2.3.2. *ALUC Executive Director's Choices:* When reviewing major land use actions in accordance with Policy 1.5.2(d), the ALUC Executive Director has two choices of action:

(a) Find that the proposed project does not contain characteristics likely to result in inconsistencies with the compatibility criteria set forth in this plan. Upon said finding, the Executive Director is authorized to approve such projects on behalf of the Commission

(b) Find that the proposed project may be inconsistent with the *Compatibility Plan.* The Executive Director shall forward any such project to the Commission for a consistency determination.

2.3.3. *Commission Action Choices:* When reviewing a major land use project proposal, the Airport Land Use Commission has three choices of action:

(a) Find the project consistent with the *Compatibility Plan.*

(b) Find the project consistent with the *Compatibility Plan*, subject to compliance with such conditions as the Commission may specify. Any such conditions should be limited in scope and described in a manner that allows compliance to be clearly assessed (e.g., the height of a structure).

(c) Find the project inconsistent with the *Compatibility Plan.* In making a finding of inconsistency, the Commission shall note the specific conflicts upon which the determination is based.

2.3.4. *Response Time:* In responding to major land use actions submitted for review, the policy of the Riverside County Airport Land Use Commission is that:

(a) When a major land use action is submitted for review on a mandatory basis as required by Policy 1.5.2.(a):

(1) Reviews by the ALUC Executive Director shall be completed within 30 days of when a complete application is submitted.

(2) Reviews of projects forwarded to the Commission for a consistency determination shall be completed within 60 days of the date of project referral.

(3) The date of referral is deemed to be the date on which all applicable project submittal information as listed in Policy 2.3.1 is received by the Commission Executive Director.

(4) If the ALUC Executive Director or the Commission fail to make a determination within the above time periods, the proposed action shall be deemed consistent with the compatibility plan.

(b) When a major land use action is submitted on an optional basis in accordance with Policy 1.5.2(b), review by the ALUC Executive Director and/or the Commission should be completed in a timely manner enabling the comments to be considered by decision-making bodies of the submitting agency.

(c) Regardless of action or failure to act on the part of the ALUC Executive Director or the Commission, the proposed action still must comply with other applicable local, state, and federal laws and regulations.

(d) The referring agency shall be notified of the ALUC Executive Director's and/or the Commission's action in writing.

2.3.5. *ALUC Response to Notification of Proposed Overruling:* If a local agency proposes to overrule an ALUC action regarding a major land use action for which ALUC review is mandatory, it must provide 45 days notice to both the ALUC and the California Division of Aeronautics and these agencies then have 30 days in which to respond (Public Utilities Code Section 21676.5(a)). The ALUC authorizes the Executive Director to respond as appropriate.

2.3.6. *Subsequent Review:* Once a project has been found consistent with the *Compatibility Plan*, it need not be referred for review at subsequent stages of the planning process (e.g., for a use permit after a zoning change has been reviewed) unless:

(a) Insufficient information was available at the time of the ALUC's original review of the project to assess whether the proposal would be fully in compliance with compatibility criteria (e.g., the site layout and structure height might not be known at the time a general plan change or zoning amendment is requested).

(b) The design of the project subsequently changes in a manner that reopens previously considered compatibility issues and could raise questions as to the validity of the earlier finding of compatibility. Proposed changes warranting a new review include, but are not limited to, the following:

(1) An increase in the number of dwelling units, intensity of use (more people on the site), or other usage characteristics to levels exceeding the criteria set forth in this plan;

(2) An increase in the height of structures or other design features such that the height limits established herein would be exceeded or exceeded by a greater amount;

(3) Major site design changes (such as incorporation of clustering or modifications to the configuration of open land areas proposed for the site) to the extent that site design was an issue in the initial project review; and/or

(4) Any significant change to a proposed project for which a special exception was granted in accordance with Policy 3.3.6.

(c) The local jurisdiction concludes that further review is warranted.

2.4. Review Process for Airport Master Plans and Development Plans

2.4.1. *Project Submittal Information:* An airport master plan or development plan submitted to the Commission for review shall contain sufficient information to enable the Commission to adequately assess the noise, safety, airspace protection, and overflight impacts of airport activity upon surrounding land uses. A master plan report should be submitted, if available.

(a) At a minimum, information to be submitted shall include:

(1) A layout plan drawing of the proposed facility showing the location of:

- Property boundaries;
- Runways or helicopter takeoff and landing areas;
- Runway or helipad protection zones;
- Aircraft or helicopter approach/departure flight routes.

(2) Airspace surfaces in accordance with Federal Aviation Regulations, Part 77.

(3) Activity forecasts, including the number of operations by each type of aircraft proposed to use the facility, the percentage of day versus night operations, and the distribution of takeoffs and landings for each runway direction.

(4) Existing and proposed flight track locations, current and projected noise contours, and other supplementary noise impact data that may be relevant.

(5) A map showing existing and planned land uses in the areas affected by aircraft activity associated with implementation of the proposed master plan or development plan.

(6) Any environmental document (initial study, draft environmental impact report, etc.) that may have been prepared for the project.

(7) Identification and proposed mitigation of impacts on surrounding land uses.

(b) Any applicable review fees as established by the Riverside County Airport Land Use Commission shall accompany the application.

2.4.2. *Commission Action Choices for Plans of Existing Airports:* When reviewing airport master plans or expansion plans for existing public-use airports, the Commission has three action choices:

(a) Find the airport plan consistent with the *Airport Land Use Compatibility Plan.*

(b) Find the airport plan inconsistent with the Commission's *Plan.*

(c) Modify the *Airport Land Use Compatibility Plan* (after duly noticed public hearing) to reflect the assumptions and proposals in the airport plan.

2.4.3. *Commission Action Choices for Reviews of New Airports or Heliports:* When reviewing proposals for new airports or heliports, the Commission's choices of action are:

(a) Approve the proposal as being consistent with the specific review policies listed in Section 5.2 below.

(b) Approve the proposal and adopt a *Compatibility Plan* for that facility. State law requires adoption of such a plan if the airport or heliport will be a public-use facility (Public Utilities Code Section 21675(a)).

(c) Disapprove the proposal on the basis that the noise, safety, airspace protection, and overflight impacts it would have on surrounding land uses are not adequately mitigated.

2.4.4. *Response Time:* The Airport Land Use Commission must respond to a local agency's submittal of an airport master plan or development plan within 60 days from the date of referral (Public Utilities Code Section 21676(d)).

(a) If the Commission fails to make a determination within that period, the proposed action shall be deemed consistent with the *Compatibility Plan.*

(b) Regardless of Commission action or failure to act, the proposed action must comply with other applicable local, state, and federal regulations and laws.

(c) The referring agency shall be notified of the Commission's action in writing.

2.4.5. *ALUC Response to Notification of Proposed Overruling:* If a local agency proposes to overrule an ALUC action regarding an airport master plan or development plan, it must provide 45 days notice to both the ALUC and the California Division of Aeronautics and these agencies then have 30 days in which to respond (Public Utilities Code Section 21676(c)). The ALUC authorizes the Executive Director to respond as appropriate.

3. COMPATIBILITY CRITERIA FOR LAND USE ACTIONS

3.1. Basic Criteria

3.1.1. *Basic Land Use Compatibility Criteria:* The basic criteria for assessing whether a land use plan, ordinance, or development proposal is to be judged compatible with a nearby airport are set forth in the Basic Compatibility Criteria matrix, Table 2A. These criteria are to be used in conjunction with the compatibility map and policies for each airport as presented in Chapter 3.

3.1.2. *Function of Supporting Criteria:* The Compatibility Criteria matrix represents a compilation of compatibility criteria associated with each of the four types of airport impacts listed in Section 1.4. For the purposes of reviewing proposed amendments to community land use plans and zoning ordinances, as well as in the review of most individual development proposals, the criteria in the matrix are anticipated to suffice.

Zone	Locations	Maximum Densities / Intensities: Residential (d.u./ac) [1]	Other Uses (people/ac) [2]: Average [6]	Single Acre [7]	with Bonus [8]	Req'd Open Land [3]	Additional Criteria: Prohibited Uses [4]	Other Development Conditions [5]
A	Runway Protection Zone and within Building Restriction Line	0	0	0	0	All Remaining	› All structures except ones with location set by aeronautical function › Assemblages of people › Objects exceeding FAR Part 77 height limits › Storage of hazardous materials › Hazards to flight [9]	› Avigation easement dedication
B1	Inner Approach/ Departure Zone	0.05 (average parcel size ≥20.0 ac.)	25	50	65	30%	› Children's schools, day care centers, libraries › Hospitals, nursing homes › Places of worship › Bldgs with >2 aboveground habitable floors › Highly noise-sensitive outdoor nonresidential uses [10] › Aboveground bulk storage of hazardous materials [11] › Critical community infrastructure facilities [12] › Hazards to flight [9]	› Locate structures maximum distance from extended runway centerline › Minimum NLR of 25 dB in residences (including mobile homes) and office buildings [13] › Airspace review required for objects >35 feet tall [14] › Avigation easement dedication
B2	Adjacent to Runway	0.1 (average parcel size ≥10.0 ac.)	100	200	260	No Req't	Same as Zone B1	› Locate structures maximum distance from runway › Minimum NLR of 25 dB in residences (including mobile homes) and office buildings [13] › Airspace review required for objects >35 feet tall [14] › Avigation easement dedication
C	Extended Approach/ Departure Zone	0.2 (average parcel size ≥5.0 ac.)	75	150	195	20%	› Children's schools, day care centers, libraries › Hospitals, nursing homes › Bldgs with >3 aboveground habitable floors › Highly noise-sensitive outdoor nonresidential uses [10] › Hazards to flight [9]	› Minimum NLR of 20 dB in residences (including mobile homes) and office buildings [13] › Airspace review required for objects >70 feet tall [15] › Deed notice required
D	Primary Traffic Patterns and Runway Buffer Area	**(1)** ≤0.2 (average parcel size ≥5.0 ac.) *or* [16] **(2)** ≥5.0 (average parcel size ≤0.2 ac.)	100	300	390	10%	› Highly noise-sensitive outdoor nonresidential uses [10] › Hazards to flight [9]	› Airspace review required for objects >70 feet tall [15] › Children's schools, hospitals, nursing homes discouraged [17] › Deed notice required
E	Other Airport Environs	No Limit	No Limit [18]			No Req't	› Hazards to flight [9]	› Airspace review required for objects >100 feet tall [15] › Major spectator-oriented sports stadiums, amphitheaters, concert halls discouraged beneath principal flight tracks [18]
*	Height Review Overlay	Same as Underlying Compatibility Zone				Not Applicable	Same as Underlying Compatibility Zone	› Airspace review required for objects >35 feet tall [14] › Avigation easement dedication

See Chapter 3 for airport-specific additions or exceptions to these policies

Table 2A

Basic Compatibility Criteria

NOTES:

[1] Residential development must not contain more than the indicated number of dwelling units (excluding secondary units) per gross acre. Clustering of units is encouraged. See Policy 4.2.5 for limitations. Gross acreage includes the property at issue plus a share of adjacent roads and any adjacent, permanently dedicated, open lands. Mixed-use development in which residential uses are proposed to be located in conjunction with nonresidential uses in the same or adjoining buildings on the same site shall be treated as nonresidential development. See Policy 3.1.3(d).

[2] Usage intensity calculations shall include all people (e.g., employees, customers/visitors, etc.) who may be on the property at a single point in time, whether indoors or outside.

[3] Open land requirements are intended to be applied with respect to an entire zone. This is typically accomplished as part of a community general plan or a specific plan, but may also apply to large (10 acres or more) development projects. See Policy 4.2.4 for definition of open land.

[4] The uses listed here are ones that are explicitly prohibited regardless of whether they meet the intensity criteria. In addition to these explicitly prohibited uses, other uses will normally not be permitted in the respective compatibility zones because they do not meet the usage intensity criteria.

[5] As part of certain real estate transactions involving residential property within any compatibility zone (that is, anywhere within an airport influence area), information regarding airport proximity and the existence of aircraft overflights must be disclosed. This requirement is set by state law. See Policy 4.4.2 for details. Easement dedication and deed notice requirements indicated for specific compatibility zones apply only to new development and to reuse if discretionary approval is required.

[6] The total number of people permitted on a project site at any time, except rare special events, must not exceed the indicated usage intensity times the gross acreage of the site. Rare special events are ones (such as an air show at the airport) for which a facility is not designed and normally not used and for which extra safety precautions can be taken as appropriate.

[7] Clustering of nonresidential development is permitted. However, no single acre of a project site shall exceed the indicated number of people per acre. See Policy 4.2.5 for details.

[8] An intensity bonus may be allowed if the building design includes features intended to reduce risks to occupants in the event of an aircraft collision with the building. See Policy 4.2.6 for details.

[9] Hazards to flight include physical (e.g., tall objects), visual, and electronic forms of interference with the safety of aircraft operations. Land use development that may cause the attraction of birds to increase is also prohibited. See Policy 4.3.7.

[10] Examples of highly noise-sensitive outdoor nonresidential uses that should be prohibited include amphitheaters and drive-in theaters. Caution should be exercised with respect to uses such as poultry farms and nature preserves.

[11] Storage of aviation fuel and other aviation-related flammable materials on the airport is exempted from this criterion. Storage of up to 6,000 gallons of nonaviation flammable materials is also exempted. See Policy 4.2.3(c) for details.

[12] Critical community facilities include power plants, electrical substations, and public communications facilities. See Policy 4.2.3(d) for details.

[13] NLR = Noise Level Reduction, the outside-to-inside sound level attenuation that the structure provides. See Policy 4.1.6.

[14] Objects up to 35 feet in height are permitted. However, the Federal Aviation Administration may require marking and lighting of certain objects. See Policy 4.3.6 for details.

[15] This height criterion is for general guidance. Shorter objects normally will not be airspace obstructions unless situated at a ground elevation well above that of the airport. Taller objects may be acceptable if determined not be obstructions. See Policies 4.3.3 and 4.3.4.

[16] Two options are provided for residential densities in *Compatibility Zone D*. Option (1) has a density limit of 0.2 dwelling units per acre (i.e., an average parcel size of at least 5.0 gross acres). Option (2) requires that the density be *greater than* 5.0 dwelling units per acre (i.e., an average parcel size *less than* 0.2 gross acres). The choice between these two options is at the discretion of the local land use jurisdiction. See Table 2B for explanation of rationale. All other criteria for *Zone D* apply to both options.

[17] Discouraged uses should generally not be permitted unless no feasible alternative is available.

[18] Although no explicit upper limit on usage intensity is defined for *Zone E*, land uses of the types listed—uses that attract very high concentrations of people in confined areas—are discouraged in locations below or near the principal arrival and departure flight tracks. This limitation notwithstanding, no use shall be prohibited in *Zone E* if its usage intensity is such that it would be permitted in *Zone D*.

Table 2A, continued

However, certain complex land use actions may require more intensive review. The Commission may refer to the supporting criteria, as listed in Section 4, to clarify or supplement its review of such actions.

3.1.3. *Residential Development:* The following criteria shall be applied to evaluation of the compatibility of proposed residential development.

(a) Any subdivision of land for residential uses within *Compatibility Zones A, B1, B2,* and *C* shall not result in a density greater than that indicated in the Compatibility Criteria matrix, Table 2A.

(1) Secondary units, as defined by state law, shall be excluded from density calculations.

(2) Clustering of development shall be limited in accordance with Policy 4.2.5(a)(2).

(b) Within *Compatibility Zone D,* local land use jurisdictions have two options. The basic option is to limit densities to no more than 0.2 dwelling units per acre. Additionally, a high-density option is provided. This option requires that densities be *greater than* 5.0 dwelling units per acre (i.e., an average parcel size *less than* 0.2 gross acres). See Table 3A for an explanation of the rationale behind these options.

(c) Other development conditions as also listed in Table 2A apply to sites within certain compatibility zones.

(d) Mixed use development in which residential uses are proposed to be located in conjunction with nonresidential uses in the same or adjoining buildings on the same site shall be treated as nonresidential development. The occupancy of the residential portion shall be added to that of the nonresidential portion and evaluated with respect to the nonresidential usage intensity criteria below.

(1) This mixed-use development policy is intended for dense, urban-type developments where the resultant ambient noise levels are relatively high. The policy is not intended to apply to projects in which the residential component is isolated from the nonresidential uses of the site.

(2) Noise attenuation and other requirements that may be specifically relevant to residential uses shall still apply.

3.1.4. *Nonresidential Development:* The compatibility of nonresidential development shall be assessed primarily with respect to its usage intensity (the number of people per acre) and the noise-sensitivity of the use. Additional criteria listed in Table 2A shall also apply.

(a) The total number of people permitted on a project site at any time, except for rare special events, must not exceed the indicated usage intensity times the gross acreage of the site.

(1) Usage intensity calculations shall include all people (e.g., employees, customers/visitors, etc.) who may be on the property at any single point in time, whether indoors or outside.

(2) Rare special events are ones (such as an air show at an airport) for which a facility is not designed and normally not used and for which extra safety precautions can be taken as appropriate.

(b) No single acre of a project site shall exceed the number of people per acre indicated in Policy 4.2.5(b) and listed in Table 2A unless special risk reduction building design measures are taken as described in Policy 4.2.6.

(c) The noise exposure limitations cited in Policy 4.1.4 and listed in Table 2B shall be the basis for assessing the acceptability of proposed nonresidential land uses relative to noise impacts. The ability of buildings to satisfy the interior noise level criteria noted in Policy 4.1.6 shall also be considered.

3.1.5. *Prohibited Uses:* Regardless of usage intensity, certain types of uses are deemed unacceptable within portions of an airport influence area. See Policy 4.2.3 and Table 2A. In addition to these explicitly prohibited uses, other uses will normally not be permitted in the respective compatibility zones because they do not meet the usage intensity criteria.

3.1.6. *Other Development Conditions:* All types of proposed development shall be required to meet the additional conditions listed in Table 2A for the respective compatibility zone where the development is to be located. Among these conditions are the following:

(a) Avigation Easement Dedication: See Policy 4.3.5.

(b) Deed Notice: See Policy 4.4.3.

(c) Real Estate Disclosure: See Policy 4.4.2.

(d) Noise Level Reduction: See Policy 4.1.6.

(e) Airspace Review: See Policy 4.3.3.

3.2. General Plan Consistency with Compatibility Plan

In order for a general plan to be considered consistent with the *Compatibility Plan*, both of the following must be accomplished (see Appendix F for additional guidance):

3.2.1. *Elimination of Conflicts:* No direct conflicts can exist between the two plans.

(a) Direct conflicts primarily involve general plan land use designations that do not meet the density or intensity criteria specified in the *Compatibility Plan* although conflicts with regard to other policies also may exist.

(b) Note, however, that a general plan cannot be found inconsistent with the *Compatibility Plan* because of land use designations that reflect existing land uses even if those designations conflict with the ALUC's compatibility criteria. Because ALUCs have no authority over existing land uses, general plan land use designations that merely reflect the existing uses for such parcels are, in effect, excluded from requirements for general plan consistency with the ALUC plan. This exception is applicable only if the general plan includes policies setting limitations on expansion and reconstruction of nonconforming uses consistent with Policies 3.3.2 and 3.3.3.

(c) To be consistent with the *Compatibility Plan*, a general plan and/or implementing ordinance also must include provisions ensuring long-term compliance with the compatibility criteria. For example, future reuse of a building must not result in a usage intensity that exceeds the applicable standard or other approved limit.

3.2.2. *Establishment of Review Process:* Provisions must be made for evaluation of proposed land use development situated within an airport influence area relative to the compatibility criteria set forth in the *Compatibility Plan.*

(a) Even if the land use designations in a general plan have been deemed consistent with the *Compatibility Plan*, evaluation of the proposed development relative to the land use designations alone is usually insufficient. General plans typically do not contain the detailed airport land use compatibility criteria necessary for a complete compatibility evaluation of proposed development.

(b) Local jurisdictions have the following choices for satisfying this evaluation requirement:

(1) Sufficient detail can be included in the general plan and/or referenced implementing ordinances and regulations to enable the local jurisdiction to assess whether a proposed development fully meets the compatibility criteria specified in the applicable compatibility plan (this requires both that the compatibility criteria be identified and that project review procedures be described);

(2) The ALUC's compatibility plan can be adopted by reference (in this case, the project review procedure must be described in a separate instrument presented to and approved by the ALUC); and/or

(3) The general plan can indicate that all major land use actions, as listed in Policy 1.5.3 or otherwise agreed to by the ALUC, shall be referred to the Commission for review in accordance with the policies of Section 2.3.

3.3. Special Conditions

3.3.1. *Infill:* Where development not in conformance with the criteria set forth in this *Compatibility Plan* already exists, additional infill development of similar land uses may be allowed to occur even if such land uses are to be prohibited elsewhere in the zone. This exception does not apply within *Compatibility Zones A* or *B1*.

(a) A parcel can be considered for *infill* development if it meets *all* of the following criteria plus the applicable provisions of either Sub-policy (b) or (c) below:

(1) The parcel size is no larger than 20.0 acres.

(2) At least 65% of the site's perimeter is bounded (disregarding roads) by existing uses similar to, or more intensive than, those proposed.

(3) The proposed project would not extend the perimeter of the area defined by the surrounding, already developed, incompatible uses.

(4) Further increases in the residential density, nonresidential usage intensity, and/or other incompatible design or usage characteristics (e.g., through use permits, density transfers, addition of second units on the same parcel, height variances, or other strategy) are prohibited.

(5) The area to be developed cannot previously have been set aside as open land in accordance with policies contained in this *Plan* unless replacement open land is provided within the same compatibility zone.

(b) For residential development, the average development density (dwelling units per gross acre) of the site shall not exceed the lesser of:

(1) The average density represented by all existing lots that lie fully or partially within a distance of 300 feet from the boundary of the parcel to be divided; or

(2) Double the density permitted in accordance with the criteria for that location as indicated in the Compatibility Criteria matrix, Table 2A.

(c) For nonresidential development, the average usage intensity (the number of people per gross acre) of the site's proposed use shall not exceed the lesser of:

(1) The average intensity of all existing uses that lie fully or partially within a distance of 300 feet from the boundary of the proposed development; or

(2) Double the intensity permitted in accordance with the criteria for that location as indicated in the Compatibility Criteria matrix, Table 2A.

(d) The single-acre and risk-reduction design density and intensity multipliers described in Policies 4.2.5 and 4.2.6 and listed in Table 2A are applicable to infill development.

(e) Infill development on some parcels should not enable additional parcels to then meet the qualifications for infill. The ALUC's intent is that parcels eligible for infill be determined just once. Thus, in order for the ALUC to consider proposed development under these infill criteria, the entity having land use authority (Riverside County or affected cities) must first identify the qualifying locations in its general plan or other adopted planning document approved by the ALUC. This action may take place in conjunction with the process of amending a general plan for consistency with the ALUC plan or may be submitted by the local agency for consideration by the ALUC at the time of initial adoption of this *Compatibility Plan*. In either case, the burden for demonstrating that a proposed development qualifies as infill rests with the affected land use jurisdiction and/or project proponent.

3.3.2. *Nonconforming Uses:* Existing uses (including a parcel or building) not in conformance with this *Compatibility Plan* may only be expanded as follows:

(a) Nonconforming residential uses may be expanded in building size provided that the expansion does not result in more dwelling units than currently exist on the parcel (a bedroom could be added, for example, but a separate dwelling unit could not be built). No ALUC review of such improvements is required.

(b) A nonconforming nonresidential development may be continued, leased, or sold and the facilities may be maintained or altered (including potentially enlarged), provided that the portion of the site devoted to the nonconforming use is not expanded and the usage intensity (the number of people per acre) is not increased above the levels existing at the time of adoption of this *Compatibility Plan*. No ALUC review of such changes is required.

(c) ALUC review is required for any proposed expansion of a nonconforming use (in terms of the site size or the number of dwelling units or people on the site). Factors to be considered in such reviews include whether the development qualifies as infill (Policy 3.3.1) or warrants approval because of other special conditions (Policy 3.3.6).

3.3.3. *Reconstruction:* An existing nonconforming development that has been fully or partially destroyed as the result of a calamity may be rebuilt only under the following conditions:

(a) Nonconforming residential uses may be rebuilt provided that the expansion does not result in more dwelling units than existed on the parcel at the time of the damage.

(b) A nonconforming nonresidential development may be rebuilt provided that it has been only partially destroyed and that the reconstruction does not increase the floor area of the previous structure or result in an increased intensity of use (i.e., more people per acre). Partial destruction shall be considered to mean damage that can be repaired at a cost of no more than 75% of the assessor's full cash value of the structure at the time of the damage.

(c) Any nonresidential use that has been more than 75% destroyed must comply with all applicable standards herein when reconstructed.

(d) Reconstruction under Paragraphs (1) or (2) above must begin within 24 months of the date the damage occurred.

(e) The above exceptions do no apply within *Zone A* or where such reconstruction would be in conflict with a county or city general plan or zoning ordinance.

(f) Nothing in the above policies is intended to preclude work required for normal maintenance and repair.

3.3.4. *Development by Right:* Nothing in these policies prohibits:

(a) Construction of a single-family home, including a second unit as defined by state law, on a legal lot of record if such use is permitted by local land use regulations.

(b) Construction of other types of uses if local government approvals qualify the development as effectively existing (see Policy 1.2.10 for definition).

(c) Lot line adjustments provided that new developable parcels would not be created and the resulting gross density or intensity of the affected property would not exceed the applicable criteria indicated in the Compatibility Criteria matrix, Table 2A.

3.3.5. *Parcels Lying within Two or More Compatibility Zones:* For the purposes of evaluating consistency with the compatibility criteria set forth herein, any parcel that is split by compatibility zone boundaries shall be considered as if it were multiple parcels divided at the compatibility zone boundary line. However, the density or intensity of development allowed within the more restricted portion of the parcel can (and is encouraged to) be transferred to the less restricted portion. This transfer of development is permitted even if the resulting density or intensity in the less restricted area would then exceed the limits which would otherwise apply within that compatibility zone.

3.3.6. *Other Special Conditions:* The compatibility criteria set forth in this *Plan* are intended to be applicable to all locations within each airport's influence area. However, it is recognized that there may be specific situations where a normally incompatible use can be considered compatible because of terrain, specific location, or other extraordinary factors or circumstances related to the site.

(a) After due consideration of all the factors involved in such situations, the Commission may find a normally incompatible use to be acceptable.

(b) In reaching such a decision, the Commission shall make specific findings as to why the exception is being made and that the land use will not create a safety hazard to people on the ground or aircraft in flight nor result in excessive noise exposure for the proposed use. Findings also shall be made as to the nature of the extraordinary circumstances that warrant the policy exception.

(c) The burden for demonstrating that special conditions apply to a particular development proposal rests with the project proponent and/or the referring agency, not with the ALUC.

(d) The granting of a special conditions exception shall be considered site specific and shall not be generalized to include other sites.

(e) Special conditions that warrant general application in all or part of the influence area of one airport, but not at other airports, are set forth in Chapter 3 of this *Compatibility Plan.*

4. Supporting Compatibility Criteria

4.1. Noise

4.1.1. *Policy Objective:* The purpose of noise compatibility policies is to avoid establishment of noise-sensitive land uses in the portions of airport environs that are exposed to significant levels of aircraft noise.

4.1.2. *Noise Contours:* The evaluation of airport/land use noise compatibility shall consider both the current and future Community Noise Equivalent Level (CNEL) contours of each airport as depicted in Chapter 3 of this *Plan.*

(a) At most airports in the county, anticipated growth in aircraft operations results in projected future noise contours being larger than current ones. However, in some instances, factors such as introduction of a quieter aircraft fleet mix, planned changes to the configuration of airport runways, or expected modifications to flight procedures can result in current contours being larger than the future contours in some or all of the airport environs. In these cases, a composite of the contours for the two time frames shall be considered in compatibility analyses.

(b) For airport at which aircraft activity has substantial seasonal or weekly characteristics, noise contours associated with the peak operating season or days of the week shall be taken into account in assessing land use compatibility.

(c) Projected noise contours included in Chapter 3 are calculated based upon forecasted aircraft activity as indicated in an airport master plan or that is considered by the Riverside County Airport Land Use Commission to be plausible (refer to activity data in the Background Data volumes). The Airport Land Use Commission or the entities that operate airports in Riverside County should periodically review these projected noise level contours and update them if appropriate.

4.1.3. *Application of Noise Contours:* The locations of CNEL contours are among the factors used to define compatibility zone boundaries and criteria. Because of the inherent variability of flight paths and other factors that influence noise emissions, the depicted contour boundaries are not absolute determinants of the compatibility or incompatibility of a given land use on a specific site or a portion thereof. Noise contours can only quantify noise impacts in a general manner. Except on large parcels or blocks of land (sites large enough to have 3 dB or more of variation in CNELs), they should *not* be used as site design criteria. (Note, though, that the airport noise contours set forth in this *Plan* are to be used as the basis for determining compliance with interior noise level criteria as listed in Policy 4.1.6.)

4.1.4. *Noise Exposure in Residential Areas:* Unless otherwise indicated in the airport-specific policies listed in Chapter 3, the maximum CNEL considered normally acceptable for new residential land uses in the vicinity of the airports covered by this *Plan* is 60 dB for all airports except low-activity outlying airports (Chiriaco Summit and Desert Center) for which the criterion is 55 dB. These standards shall be based upon noise contours calculated as described above.

4.1.5. *Noise Exposure for Other Land Uses:* Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. The extent of outdoor activity associated with a particular land use is an important factor to be considered in evaluating its compatibility with airport noise. Examples of acceptable noise levels for other land uses in an airport's vicinity are presented in Table 2B.

4.1.6. *Interior Noise Levels:* Land uses for which interior activities may be easily disrupted by noise shall be required to comply with the following interior noise level criteria.

(a) The maximum, aircraft-related, interior noise level that shall be considered acceptable for land uses near airports is 45 dB CNEL in:

- Any habitable room of single- or multi-family residences;
- Hotels and motels;
- Hospitals and nursing homes;
- Churches, meeting halls, theaters, and mortuaries;
- Office buildings; and
- Schools, libraries, and museums.

(b) The noise contours depicted in Chapter 3 of this *Plan* shall be used in calculating compliance with these criteria. The calculations should assume that windows are closed.

(c) When reviewed as part of a general plan or zoning ordinance amendment or as a major land use action, evidence that proposed structures will be designed to comply with the above criteria shall be submitted to the ALUC under the following circumstances:

(1) Any mobile home situated within an airport's 55-dB CNEL contour. [A typical mobile home has an average exterior-to-interior noise level reduction (NLR) of approximately 15 dB with windows closed.]

Land Use Category	CNEL (dB) 50–55	55–60	60–65	65–70	70–75
Residential *					
single-family, nursing homes, mobile homes	++	o	–	––	––
multi-family, apartments, condominiums	++	+	o	––	––
Public					
schools, libraries, hospitals	+	o	–	––	––
churches, auditoriums, concert halls	+	o	o	–	––
transportation, parking, cemeteries	++	++	++	+	o
Commercial and Industrial					
offices, retail trade	++	+	o	o	–
service commercial, wholesale trade, warehousing, light industrial	++	++	+	o	o
general manufacturing, utilities, extractive industry	++	++	++	+	+
Agricultural and Recreational					
cropland	++	++	++	++	+
livestock breeding	++	+	o	o	–
parks, playgrounds, zoos	++	+	+	o	–
golf courses, riding stables, water recreation	++	++	+	o	o
outdoor spectator sports	++	+	+	o	–
amphitheaters	+	o	–	––	––

Land Use Acceptability		Interpretation/Comments
++	*Clearly Acceptable*	The activities associated with the specified land use can be carried out with essentially no interference from the noise exposure.
+	*Normally Acceptable*	Noise is a factor to be considered in that slight interference with outdoor activities may occur. Conventional construction methods will eliminate most noise intrusions upon indoor activities.
o	*Marginally Acceptable*	The indicated noise exposure will cause moderate interference with outdoor activities and with indoor activities when windows are open. The land use is acceptable on the conditions that outdoor activities are minimal and construction features which provide sufficient noise attenuation are used (e.g., installation of air conditioning so that windows can be kept closed). Under other circumstances, the land use should be discouraged.
–	*Normally Unacceptable*	Noise will create substantial interference with both outdoor and indoor activities. Noise intrusion upon indoor activities can be mitigated by requiring special noise insulation construction. Land uses which have conventionally constructed structures and/or involve outdoor activities which would be disrupted by noise should generally be avoided.
––	*Clearly Unacceptable*	Unacceptable noise intrusion upon land use activities will occur. Adequate structural noise insulation is not practical under most circumstances. The indicated land use should be avoided unless strong overriding factors prevail and it should be prohibited if outdoor activities are involved.

* Subtract 5 dB for low-activity outlying airports (Chiriaco Summit and Desert Center)

Table 2B

Supporting Compatibility Criteria: Noise

(2) Any single- or multi-family residence situated within an airport's 60-dB CNEL contour. [Wood frame buildings constructed to meet 1990s standards for energy efficiency typically have an average NLR of approximately 20 dB with windows closed.]

(3) Any hotel or motel, hospital or nursing home, church, meeting hall, office building, mortuary, school, library, or museum situated with an airport's 65-dB CNEL contour.

4.1.7. *Engine Run-Up and Testing Noise:* ALUC consideration of noise from aircraft engine run-ups and testing activities shall be limited as follows:

(a) Aircraft noise associated with pre-flight engine run-ups, taxiing of aircraft to and from runways, and other operation of aircraft on the ground is considered part of airport operations and therefore is not subject to ALUC authority.

(1) Noise from these sources can be, but normally is not, represented in airport noise contours. It is not included in the noise contours prepared for this *Compatibility Plan.* Nevertheless, when reviewing the compatibility of proposed land uses in locations near the airport where such noise may be significant, the Commission may seek additional data and may take into account noise from these ground-based sources.

(2) Noise from aircraft ground operations also should be considered by the Commission when reviewing airport master plans or development plans in accordance with Section 2.4 herein.

(b) Noise from the testing of aircraft engines on airport property is not deemed an activity inherent in the operation of an airport and thus it is not an airport-related impact addressed by this *Compatibility Plan.* Noise from these sources should be addressed by the noise policies of local agencies in the same manner as noise from other industrial sources. (Engine testing noise is not normally included in the noise contours prepared for an airport. However, aircraft noise modeling programs have the capability of including noise from this source. At airports where engine testing takes place or is proposed, the ALUC may need to ascertain whether the noise was or was not included in the noise contour calculations.)

4.1.8. *Construction of New or Expanded Airports or Heliports:* Any proposed construction of a new airport or heliport or expansion of facilities at an existing airport or heliport which would result in a significant increase in cumulative noise exposure (measured in terms of CNEL) shall include measures to reduce the exposure to a less-than-significant level. For the purposes of this plan, a noise increase shall be considered significant if:

(a) In locations having an existing ambient noise level of less than 60 dB CNEL, the project would increase the noise level by 5.0 dB or more.

(b) In locations having an existing ambient noise level of between 60 and 65 dB CNEL, the project would increase the noise level by 3.0 dB or more.

(c) In locations having an existing ambient noise level of more than 65 dB CNEL, the project would increase the noise level by 1.5 dB or more.

4.2. Safety

4.2.1. *Policy Objective:* The intent of land use safety compatibility criteria is to minimize the risks associated with an off-airport aircraft accident or emergency landing.

(a) Risks both to people and property in the vicinity of an airport and to people on board the aircraft shall be considered.

(b) The most stringent land use controls shall be applied to the areas with the greatest potential risks.

4.2.2. *Risks to People on the Ground:* The principal means of reducing risks to people on the ground is to restrict land uses so as to limit the number of people who might gather in areas most susceptible to aircraft accidents. The usage intensity criteria cited in Table 2A reflect the risks associated with various locations in the environs of the airports in the county. (Methods for determining the concentration of people for various land uses are provided in Appendix C.)

4.2.3. *Land Uses of Special Concern:* Certain types of land uses represent special safety concerns irrespective of the number of people associated with those uses. Land uses of particular concern include:

(a) Uses Having Vulnerable Occupants: Uses in which the occupants have reduced effective mobility or are unable to respond to emergency situations shall be prohibited within all *Compatibility Zones* except *Zone E*. These uses include children's schools and day care centers (with 7 or more children), hospitals, nursing homes, and other uses in which the majority of occupants are children, elderly, and/or handicapped.

(1) This general policy may be superseded by airport specific policies (see Chapter 3).

(2) Hospitals are medical facilities which include provision for overnight stays by patients. Medical clinics are permitted in *Compatibility Zones C* and *D* provided that these facilities meet the maximum intensity standards listed in the Compatibility Criteria matrix, Table 2A.

(b) Multi-story Buildings: In the event of an emergency resulting from an aircraft accident, low-rise buildings can be more readily evacuated than those with more floors. On this basis, the following limitations are established:

(1) Within *Compatibility Zone A,* new occupied structures are not permitted.

(2) Within *Compatibility Zones B1* and *B2*, new buildings shall be limited to no more than two occupied floors above ground.

(3) Within *Compatibility Zone C*, new buildings shall be limited to no more than three occupied floors above ground.

(c) Hazardous Materials Storage: Construction of facilities for the manufacture or storage of fuel, explosives, and other hazardous materials within the airport environs is restricted as follows:

(1) Within *Compatibility Zone A,* manufacture or storage of any such substance is prohibited.

(2) Within *Compatibility Zones B1* and *B2*, only the following is permitted:

- Fuel or hazardous substances stored in underground tanks.

- On-airport storage of aviation fuel and other aviation-related flammable materials.
- Aboveground storage of less than 6,000 gallons of nonaviation flammable materials (this limit coincides with a break-point used in the Uniform Fire Code to distinguish between different classes of tanks).

(3) Within *Compatibility Zone C*, manufacture or storage of hazardous materials other than the types listed in Sub-policy (2) above is prohibited unless no other feasible alternative site exists and the facility is designed in a manner that minimizes its susceptibility to damage from an aircraft accident.

(d) Critical Community Infrastructure: Construction of power plants, electrical substations, public communications facilities, and other critical community infrastructure shall be restricted as follows:

(1) Within *Compatibility Zone A*, all such uses are prohibited.

(2) Within *Compatibility Zones B1* and *B2*, such uses are prohibited unless no other feasible alternative site exists and the facility is designed in a manner that minimizes its susceptibility to damage from an aircraft accident.

4.2.4. *Open Land:* In the event that a light aircraft is forced to land away from an airport, the risks to the people on board can best be minimized by providing as much open land area as possible within the airport vicinity. This concept is based upon the fact that the majority of light aircraft accidents and incidents occurring away from an airport runway are controlled emergency landings in which the pilot has reasonable opportunity to select the landing site.

(a) To qualify as open land, an area should be:

(1) Free of most structures and other major obstacles such as walls, large trees or poles (greater than 4 inches in diameter, measured 4 feet above the ground), and overhead wires.

(2) Have minimum dimensions of approximately 75 feet by 300 feet.

(b) Roads and automobile parking lots are acceptable as open land areas if they meet the above criteria.

(c) Open land requirements for each compatibility zone are to be applied with respect to the entire zone. Individual parcels may be too small to accommodate the minimum-size open area requirement. Consequently, the identification of open land areas must initially be accomplished at the general plan or specific plan level or as part of large (10 acres or more) development projects.

(d) Clustering of development, subject to the limitations noted below, and providing contiguous landscaped and parking areas is encouraged as a means of increasing the size of open land areas.

(e) Building envelopes and the airport compatibility zones should be indicated on all development plans and tentative maps for projects located within the influence area of airports covered by this *Compatibility Plan*. Portraying this information is intended to assure that individual development projects provide the open land areas identified in the applicable general plan, specific plan, or other large-scale plan.

4.2.5. *Limitations on Clustering:* Policy 4.2.4(d) notwithstanding, limitations shall be set on the maximum degree of clustering or usage intensity acceptable within a portion of a large project site. These criteria are intended to limit the number of people at risk in a concentrated area.

(a) Clustering of new residential development shall be limited as follows:

(1) Within *Compatibility Zone A*, clustering is not applicable.

(2) Within *Compatibility Zones B1*, *B2*, and *C*, no more than 4 dwelling units shall be allowed in any individual acre. Buildings shall be located as far as practical from the extended runway centerline and normal aircraft flight paths.

(b) Unless special design measures as listed in Policy 4.2.6 are utilized, usage intensity of new nonresidential development shall be limited as follows:

(1) Within *Compatibility Zone A*, clustering is not applicable.

(2) Within *Compatibility Zone B1*, uses shall be limited to a maximum of 50 people per any individual acre (i.e., a maximum of double the average intensity criterion set in Table 2A). Theaters, restaurants, most shopping centers, motels, intensive manufacturing or office uses, and other similar uses typically do not comply with this criterion.

(3) Within *Compatibility Zone B2*, uses shall be limited to a maximum of 200 people per any individual acre (i.e., a maximum of double the average intensity criterion set in Table 2A). Theaters, major shopping centers (500,000 or more square feet), large motels and hotels with conference facilities, and similar uses typically do not comply with this criterion.

(4) Within *Compatibility Zone C*, uses shall be limited to a maximum of 150 people per any individual acre (i.e., a maximum of double the average intensity criterion set in Table 2A). Theaters, fast-food establishments, high-intensity retail stores or shopping centers, motels and hotels with conference facilities, and similar uses typically do not comply with this criterion.

(5) Within *Compatibility Zone D*, uses shall be limited to a maximum of 300 people per any individual acre (i.e., a maximum of triple the average intensity criterion set in Table 2A).

(c) For the purposes of the above policies, the one-acre areas to be evaluated shall be rectangular (reasonably close to square, not elongated or irregular) in shape.

(d) In no case shall a proposed development be designed to accommodate more than the total number of dwelling units per acre (for residential uses) or people per acre (for nonresidential uses) indicated in Table 2A times the gross acreage of the project site. A project site may include multiple parcels. Appendix D lists examples of the types of land uses which are potentially compatible under these criteria and the types of land uses which are considered incompatible.

4.2.6. *Risk Reduction Through Building Design:* The number of people permitted to occupy a single nonresidential building may be increased by a factor of up to 1.3 times the limitations set by the preceding policy on clustering if special measures are taken to reduce the risks to building occupants in the event that the building is struck by an aircraft.

(a) This intensity bonus is not applicable within *Compatibility Zone A* (no buildings are permitted) or *E* (densities and intensities are not limited) and shall not be applied to buildings situated within *Compatibility Zones B1*, *B2*, or *C* for runways routinely used by large aircraft (aircraft having a maximum certificated takeoff weight of more than 12,500 pounds).

(b) Building design features which would enable application of an intensity bonus include, but are not limited to, the following:

- Using concrete walls;
- Limiting the number and size of windows;
- Upgrading the strength of the building roof;
- Avoiding skylights;
- Enhancing the fire sprinkler system;
- Limiting buildings to a single story; and
- Increasing the number of emergency exits.

(c) Project proponents who wish to request an intensity bonus must include appropriate details of the building design along with their project review application.

(d) Intensity bonuses shall be considered and approved by affected local jurisdictions on a case-by-case basis. The criteria to be used by each jurisdiction when considering intensity bonus requests shall be reviewed and approved by the ALUC as part of the general plan consistency process or subsequent action.

4.3. Airspace Protection

4.3.1. *Policy Objective:* Tall structures, trees, and other objects, particularly when located near airports or on high terrain, may constitute hazards to aircraft in flight. Federal regulations establish the criteria for evaluating potential obstructions. These regulations also require that the Federal Aviation Administration be notified of proposals for creation of certain such objects. The FAA conducts "aeronautical studies" of these objects and determines whether they would be hazards, but it does not have the authority to prevent their creation. The purpose of ALUC airspace protection policies, together with regulations established by local land use jurisdictions and the state government, is to ensure that hazardous obstructions to the navigable airspace do not occur.

4.3.2. *Basis for Height Limits:* The criteria for limiting the height of structures, trees, and other objects in the vicinity of an airport shall be based upon: Part 77, Subpart C, of the Federal Aviation Regulations (FAR); the United States Standard for Terminal Instrument Procedures (TERPS); and applicable airport design standards published by the Federal Aviation Administration. Airspace plans depicting the critical areas for airspace protection around each of the airports covered by this *Compatibility Plan* are depicted in Chapter 3.

4.3.3. *ALUC Review of Height of Proposed Objects:* Based upon FAA criteria, proposed objects that would exceed the heights indicated below for the respective compatibility zones potentially represent airspace obstructions issues. Development proposals that include any such objects shall be reviewed by the ALUC. Objects of lesser height normally would not have a potential for being airspace obstructions and therefore do

not require ALUC review with respect to airspace protection criteria (noise, safety, and overflight concerns may still be present). Caution should be exercised, however, with regard to any object more than 50 feet high proposed to be located on a site that is substantially higher than surrounding terrain.

(a) Within *Compatibility Zone A*, the height of any proposed development, including vegetation, requires review.

(b) Within *Compatibility Zone B1*, ALUC review is required for any proposed object taller than 35 feet unless the airport controls an easement on the land on which the object is to be located and grants a waiver to height restrictions.

(c) Within *Compatibility Zone B2*, ALUC review is required for any proposed object taller than 35 feet.

(d) Within *Compatibility Zones C* and *D*, ALUC review is required for any proposed object taller than 70 feet.

(e) Within *Compatibility Zone E*, ALUC review is required for any proposed object taller than 100 feet.

(f) Within the *Height Review Overlay Zone*, ALUC review is required for any proposed object taller than 35 feet above the ground. The approximate extent of the *Height Review Overlay Zone* is indicated on the respective *Compatibility Map* included for each airport in Chapter 3.

4.3.4. *Height Restriction Criteria:* The height of objects within the influence area of each airport shall be reviewed, and restricted if necessary, according to the following criteria. The locations of these zones are depicted on the respective *Compatibility Map* for each airport.

(a) Within *Compatibility Zone A*, the height of all objects shall be limited in accordance with applicable Federal Aviation Administration criteria including FAR Part 77, TERPS, and/or airport design standards.

(b) Within *Compatibility Zones B1*, *B2*, or *Height Review Overlay Zone*:

(1) Objects up to 35 feet tall are acceptable and do not require ALUC review for the purposes of height factors.

(2) ALUC review is required for any proposed object taller than 35 feet.

(3) Federal Aviation Administration review may be necessary for proposed objects adjacent to the runway edges and the FAA may require marking and lighting of certain objects (the affected areas are generally on airport property).

(c) Within *Compatibility Zones C* and *D*, generally, there is no concern with regard to any object up to 70 feet tall unless it is located on high ground or it is a solitary object (e.g., an antenna) more than 35 feet taller than other nearby objects.

(d) Within *Compatibility Zone E*, generally, there is no concern with regard to any object up to 100 feet tall unless it is located on high ground or it is a solitary object (e.g., an antenna) more than 35 feet above the ground.

4.3.5. *Avigation Easement Dedication:* As a condition for development approval, the owner of any property proposed for development within *Compatibility Zones A*, *B1*, or *B2* or a

Height Review Overlay Zone shall be required to dedicate an avigation easement to the entity owning the affected airport. The avigation easement shall:

(a) Provide the right of flight in the airspace above the property;

(b) Allow the generation of noise and other impacts associated with aircraft overflight;

(c) Restrict the height of structures, trees and other objects;

(d) Permit access to the property for the removal or aeronautical marking of objects exceeding the established height limit; and

(e) Prohibit electrical interference, glare, and other potential hazards to flight from being created on the property. An example of an avigation easement is provided in Appendix G.

4.3.6. *FAA Notification:* Proponents of a project involving objects that may exceed a Part 77 surface must notify the Federal Aviation Administration as required by FAR Part 77, Subpart B, and by the Public Utilities Code, Sections 21658 and 21659. (Notification to the Federal Aviation Administration under FAR Part 77, Subpart B, is required even for certain proposed construction that does not exceed the height limits allowed by Subpart C of the regulations. Refer to Appendix B for the specific Federal Aviation Administration notification requirements.)

(a) Local jurisdictions shall inform project proponents of the requirements for notification to the Federal Aviation Administration.

(b) The requirement for notification to the Federal Aviation Administration shall not necessarily trigger an airport compatibility review of an individual project by the Airport Land Use Commission if the project is otherwise in conformance with the compatibility criteria established herein.

(c) FAA review is required for any proposed structure more than 200 feet above the surface level of its site. All such proposals also shall be submitted to the ALUC for review regardless of where in the county they would be located.

(d) Any project submitted to the ALUC for airport land use compatibility review for reason of height-limit issues shall include a copy of FAR Part 77 notification to the Federal Aviation Administration and the FAA findings if available.

4.3.7. *Other Flight Hazards:* New land uses that may cause visual, electronic, or increased bird strike hazards to aircraft in flight shall not be permitted within any airport's influence area. Specific characteristics to be avoided include:

(a) Glare or distracting lights which could be mistaken for airport lights;

(b) Sources of dust, steam, or smoke which may impair pilot visibility;

(c) Sources of electrical interference with aircraft communications or navigation; and

(d) Any proposed use, especially landfills and certain agricultural uses, that creates an increased attraction for large flocks of birds. (Refer to FAA Order 5200.5A, *Waste Disposal Sites on or Near Airports* and Advisory Circular 150/5200-33A, *Hazardous Wildlife Attractants On or Near Airports.)*

4.4. Overflight

4.4.1. *Policy Objective:* Noise from individual operations, especially by comparatively loud aircraft, can be intrusive and annoying in locations beyond the limits of the mapped noise contours. Sensitivity to aircraft overflights varies from one person to another. The purpose of overflight compatibility policies is to help notify people about the presence of overflights near airports so that they can make more informed decisions regarding acquisition or lease of property in the affected areas. Overflight compatibility is particularly important with regard to residential land uses.

4.4.2. *State Law Requirements Regarding Real Estate Transfer Disclosure:* Effective January 1, 2004, California state statutes (Business and Professional Code Section 11010 and Civil Code Sections 1102.6, 1103.4, and 1353) require as part of residential real estate transactions that information be disclosed regarding whether the property is situated within an airport influence area.

(a) With certain exceptions, these state requirements apply both to the sale or lease of newly subdivided lands and to the sale of existing residential property.

(b) The statutes define an *airport influence area* as "the area in which current or future airport-related noise, overflight, safety, or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses as determined by an airport land use commission." The *airport influence area* for each of the airports in Riverside County subject to this *Compatibility Plan* is indicated on that airport's *compatibility map* contained in Chapter 3 herein.

(c) Where disclosure is required, the following statement shall be provided:

> NOTICE OF AIRPORT IN VICINITY: This property is presently located in the vicinity of an airport, within what is known as an airport influence area. For that reason, the property may be subject to some of the annoyances or inconveniences associated with proximity to airport operations (for example: noise, vibration, or odors). Individual sensitivities to those annoyances can vary from person to person. You may wish to consider what airport annoyances, if any, are associated with the property before you complete your purchase and determine whether they are acceptable to you.

(d) For the purposes of this *Compatibility Plan*, the above real estate disclosure provisions of state law shall continue in effect as Airport Land Use Commission policy with respect to new development even if the law is rescinded. Furthermore, each land use jurisdiction affected by this *Compatibility Plan* should adopt a policy designating the airport influence area as the area wherein disclosure of airport influences is required in conjunction with the transfer of residential real estate. Such local jurisdiction policies also should be applied to lease or rental agreements for existing residential property.

4.4.3. *Deed Notices:* In addition to the preceding real estate transfer disclosure requirements, a *deed notice* shall be recorded for each parcel associated with any discretionary land use action affecting property within an airport influence area. (Note that the *avigation easement* required by Policy 4.3.5 to be dedicated in conjunction with development in *Zones A, B1, B2,* and the *Height Review Overlay Zone* serves as a deed notice in those locations.) The notice shall include the language indicated above with respect to real estate transfer disclosures.

4.4.4. *Land Use Conversion:* The compatibility of uses in the airport influence areas shall be preserved to the maximum feasible extent. Particular emphasis should be placed on preservation of existing agricultural and open space uses.

(a) The conversion of land from existing or planned agricultural, open space, industrial, or commercial use to residential uses within *Compatibility Zones A, B1, B2,* and *C* is strongly discouraged.

(b) In *Compatibility Zone D,* general plan amendments (as well as other discretionary actions such as rezoning, subdivision approvals, use permits, etc.) that would convert land to residential use or increase the density of residential uses should be subject to careful consideration of overflight impacts.

5. COMPATIBILITY CRITERIA FOR AIRPORT DEVELOPMENT ACTIONS

5.1. Criteria for Master or Development Plans of Existing Airports

5.1.1. *Substance of Review:* When reviewing airport master plans or development plans for existing airports, the Commission shall determine whether activity forecasts or proposed facility development identified in the plan differ from the forecasts and development assumed for that airport in this *Airport Land Use Compatibility Plan.* Attention should specifically focus on:

(a) Activity forecasts that are: (1) significantly higher than those in the *Airport Land Use Compatibility Plan*; or that (2) include a higher proportion of larger or noisier aircraft.

(b) Proposals to: (1) construct a new runway or helicopter takeoff and landing area; (2) change the length, width, or landing threshold location of an existing runway; or (3) establish an instrument approach procedure.

5.1.2. *Noise Impacts of New or Expanded Airports or Heliports:* Any proposed construction of a new airport or heliport or expansion of facilities at an existing airport or heliport that would result in a significant increase in cumulative noise exposure (measured in terms of CNEL) shall include measures to reduce the exposure to a less-than-significant level. For the purposes of this plan, a noise increase shall be considered significant if:

(a) In locations having an existing ambient noise level of less than 55 dB CNEL, the project would increase the noise level by 5.0 dB or more.

(b) In locations having an existing ambient noise level of between 55 and 60 dB CNEL, the project would increase the noise level by 3.0 dB or more.

(c) In locations having an existing ambient noise level of more than 60 dB CNEL, the project would increase the noise level by 1.5 dB or more.

5.1.3. *Consistency Determination:* The Commission shall determine whether the proposed airport plan or development plan is consistent with the *Airport Land Use Compatibility Plan.* The Commission shall base its determination of consistency on;

(a) Findings that the forecasts and development identified in the airport plan would not result in greater noise, overflight, and safety impacts or height restrictions on surrounding land uses than are assumed in the *Airport Land Use Compatibility Plan.*

(b) A determination that any nonaviation development proposed for locations within the airport boundary (excluding federal- or state-owned property) will be consistent with the compatibility criteria and policies indicated in this *Compatibility Plan* with respect to that airport (see Policy 1.2.5 for definition of aviation-related use).

5.2. Criteria for Proposed New Airports or Heliports

5.2.1. *Substance of Review:* In reviewing proposals for new airports and heliports, the Commission shall focus on the noise, safety, airspace protection, and overflight impacts upon surrounding land uses.

(a) Other types of environmental impacts (e.g., air quality, water quality, natural habitats, vehicle traffic, etc.) are not within the scope of Commission review.

(b) The Commission shall evaluate the adequacy of the proposed facility design (in terms of federal and state standards) only to the extent that the design affects surrounding land use.

(c) The Commission must base its review on the proposed airfield design. The Commission does not have the authority to require alterations to the airfield design.

5.2.2. *Airport/Land Use Relationships:* The review shall examine the relationships between existing and planned land uses in the vicinity of the proposed airport or heliport and the impacts that the proposed facility would have upon these land uses.

(a) Questions to be considered should include:

(1) Would the existing or planned land uses be considered incompatible with the airport or heliport if the latter were already in existence?

(2) What measures are included in the airport or heliport proposal to mitigate the noise, safety, airspace protection, and overflight impacts on surrounding land uses? Such measures might include:

- Location of flight tracks so as to minimize the impacts;
- Other operational procedures to minimize impacts;
- Installation of noise barriers or structural noise insulation;
- Acquisition of property interests (fee title or easements) on the impacted land.

(b) The noise impact assessment criteria listed in Policy 5.1.2 with respect to airport expansion projects shall also be considered with regard to the review of new airport development.

3

Individual Airport Policies and Compatibility Maps

CHAPTER OVERVIEW

The policies and maps presented in this chapter provide the connection between the countywide compatibility criteria outlined in Chapter 2 and the specific features and surrounding geography of each individual airport. Included for each airport is the overall compatibility map that works in conjunction with the Basic Compatibility Criteria matrix (Table 2A) in Chapter 2. Maps of the noise contours and airspace protection (height limit) surfaces associated with the supporting policies are also found in this chapter. The airspace protection surfaces are as defined by Federal Aviation Regulations Part 77 for the respective airport.

Additionally, at some airports, special conditions as provided for in Countywide Policy 3.3.6(e) of Chapter 2 may be acknowledged by the Airport Land Use Commission in adoption of this *Compatibility Plan*. These special conditions result in establishment of compatibility zone boundaries and/or compatibility criteria different in character from the zones and criteria applicable to other airports in the county. Where any such additional policies have been adopted for a particular airport, they are listed in the following sections of this chapter. These special policies are not to be generalized or considered as precedent applicable to other locations near the same airport or to the environs of other airports addressed by this plan. For most airports, no special policies are noted and the countywide policies prevail.

The general concepts used to develop the compatibility zone boundaries depicted on the compatibility map for each airport are summarized in Table 3A. This description of the impact characteristics for each compatibility zone helps to ensure a consistent approach to map preparation. In other words, subject to the limited number of zones delineated, the noise and safety impacts affecting lands within one part of a particular zone should be similar to the impacts in another part of the same zone both for a given airport environs and compared to other airports.

Additional factors taken into account in the creation of the individual airport compatibility maps include:

- The existing airport runway configuration and any proposed changes as identified in an adopted airport master plan or approved layout plan;
- The locations of common visual traffic patterns and instrument flight tracks;

- Noise contours, typically for long-range future activity levels, but also current contours at airports where some or all of the existing contours are larger than the future ones;
- Areas of aircraft accident risk as indicated in data included in the *Airport Land Use Planning Handbook* published by the California Division of Aeronautics; and
- Other guidance regarding delineation of safety zones as noted in the state *Handbook*.

Finally, the basic compatibility zone boundaries defined by the above factors are refined as appropriate to recognize local geographic features. Where these boundaries fall near existing roads or parcel lines, the latter features are often used as the formal zone boundaries shown in the accompanying maps.

Also see Appendix H for further discussion of airport land use compatibility concepts.

Zone	Noise and Overflight Factors	Safety and Airspace Protection Factors
A *Runway Protection Zone and within Building Restriction Line*	*Noise Impact: Very High* ▸ Includes 65-CNEL contour at airports where this contour extends beyond RPZs *Note: In all zones, contours for peak-season average day, rather than annual average day, are used for airports with strong seasonal activity characteristics*	*Risk Level: Very High* ▸ Lateral to runways, zone boundary defined by the Building Restriction Line as depicted on adopted Airport Layout Plan drawing ▸ Length set to include Runway Protection Zones as indicated on Airport Layout Plan drawing ▸ Nearly 40% of off-runway general aviation accidents near airports occur in this zone
B1 *Inner Approach/ Departure Zone*	*Noise Impact: High* ▸ Generally encompasses 60-CNEL contour (55-CNEL at outlying airports) ▸ Single-event noise sufficient to disrupt wide range of land use activities including indoors if windows open	*Risk Level: High* ▸ Encompasses areas overflown by aircraft at low altitudes—typically only 200 to 400 feet above runway ▸ Some 10% to 20% of off-runway general aviation accidents near airports take place here ▸ Object heights restricted to as little as 50 feet
B2 *Adjacent to Runway*	*Noise Impact: Moderate to High* ▸ Encompasses 55-CNEL contour lateral to runway ▸ Exposed to loud single-event noise from take-offs and jet thrust-reverse on landing; also from pre-flight run-ups	*Risk Level: Low to Moderate* ▸ Area not normally overflown by aircraft; primary risk is with aircraft (especially twins) losing directional control on takeoff ▸ About 3% of off-runway general aviation accidents near airports happen in this zone ▸ Object heights restricted to as little as 35 feet
C *Extended Approach/ Departure Zone*	*Noise Impact: Moderate* ▸ Encompasses most of 55-CNEL contour beyond runway ends ▸ Aircraft typically below 1,000 feet altitude on arrival; individual events occasionally loud enough to intrude upon indoor activities	*Risk Level: Moderate* ▸ Includes areas where aircraft: › Turn from base to final approach legs of standard traffic pattern and descend from traffic pattern altitude › On departure, normally complete transition from takeoff power and flap settings to climb mode and begin turns to en route heading › On an instrument approach procedure, have descended below about 500 feet AGL ▸ Some 10% to 15% of off-runway general aviation accidents near airports occur in this zone ▸ Object heights restricted to as little as 50 feet
D *Primary Traffic Patterns*	*Noise Impact: Moderate* ▸ Contains remaining 55-CNEL contour, if any ▸ Aircraft at or above traffic pattern except for instrument approaches ▸ More concern with respect to individual loud events than with cumulative noise contours ▸ Residential density criteria for this zone provide two options on basis that noise concerns can be minimized either by limiting number of dwelling units in affected areas or by allowing high-density development which tends to have comparatively high ambient noise levels	*Risk Level: Low* ▸ Aircraft on instrument approaches below 1,000 feet ▸ About 20% to 30% of general aviation accidents take place in this zone, but large area encompassed means low likelihood of accident occurrence in any given location ▸ Risk concern is primarily with uses for which potential consequences are severe (e.g. very-high-intensity activities in a confined area) ▸ Object height limits generally at least 100 feet
E *Other Airport Environs*	*Noise Impact: Low* ▸ Beyond 55-CNEL contour ▸ Occasional overflights intrusive to some outdoor activities	*Risk Level: Low* ▸ Only 10% to 15% of near-airport accidents here ▸ Risk concern only with uses for which potential consequences are severe (e.g. very-high-intensity activities in a confined area)
*** *Height Review Overlay*	*Noise Impact: Low* ▸ Individual noise events slightly louder because high terrain reduces altitude of overflights	*Risk Level: Moderate* ▸ Modest risk because high terrain constitutes airspace obstruction ▸ Concern is tall single objects (e.g., antennas)

Table 3A

Compatibility Zone Factors

BL. BLYTHE AIRPORT

BL.1 Compatibility Map Delineation

1.1 *Airport Master Plan Status:* The *Compatibility Plan* for Blythe Airport is based upon the *Airport Master Plan* adopted by the Riverside County Board of Supervisors in 2001.

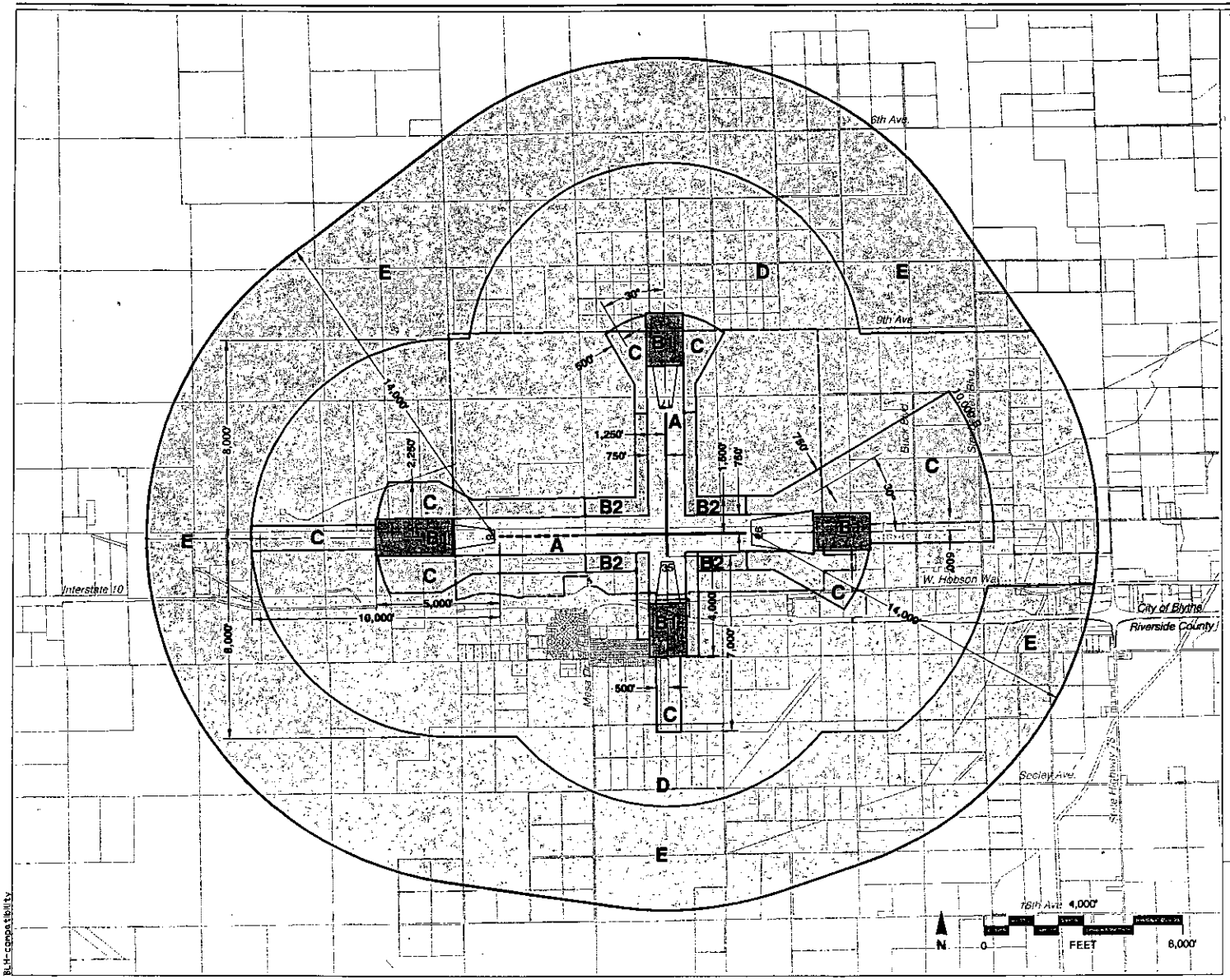
1.2 *Airfield Configuration:* The *Airport Master Plan* proposes extension of Runway 8-26 3,450 feet westward to a total length of 10,012 feet. No improvements to instrument approach capabilities are planned. These features are reflected in the *Compatibility Plan.*

1.3 *Airport Activity:* The *Compatibility Plan* assumes a long-range future activity level of 58,100 annual aircraft operations, including up to 2,200 airline aircraft operations. Total operations in 2003 are less than half of this number and there is no airline service. The long-range numbers are consistent with the *Master Plan* forecast. The *Master Plan* also describes a theoretical "ultimate" airport activity level that includes a large volume of large jet transport aircraft operations. Because the *Master Plan* does not contain recommendations, beyond extension of the runway, that would help generate activity of this magnitude, the "ultimate" activity level has not been explicitly reflected in preparation of the Compatibility Map for Blythe Airport.

1.4 *Airport Influence Area:* The airport influence area boundary is defined by the outer edge of the FAR Part 77 conical surface.

BL.2 Additional Compatibility Policies

2.1 None.



Legend

Compatibility Zones

- Airport Influence Area Boundary
- Zone A
- Zone B1
- Zone B2
- Zone C
- Zone D
- Zone E

Boundary Lines

- Airport Property Line
- City Limits

Note

Airport influence boundary measured from a point 200 feet beyond runway ends in accordance with FAA airspace protection criteria (FAR Part 77). All other dimensions measured from runway ends and centerlines.

See Chapter 2, Table 2A for compatibility criteria associated with this map.

Riverside County
Airport Land Use Commission

Riverside County
Airport Land Use Compatibility Plan
Policy Document

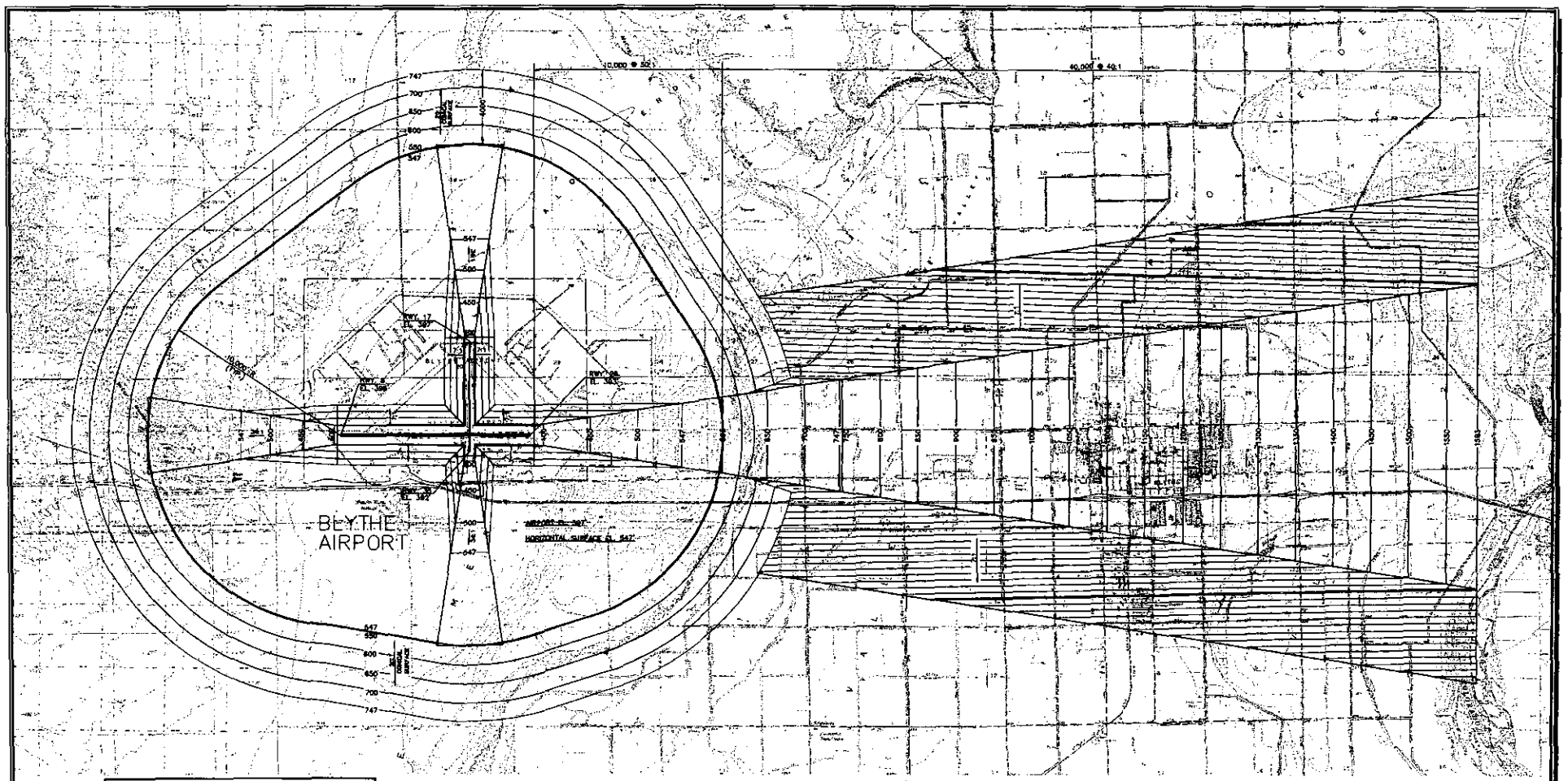
(Adopted October 2004)

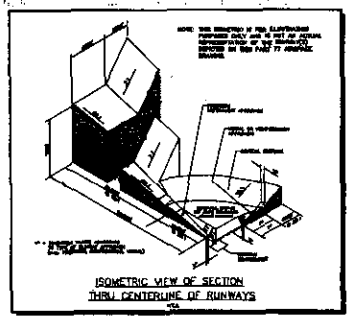
Map BL-1

Compatibility Map

Blythe Airport

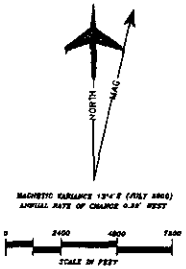
BLH-compatibility





ISOMETRIC VIEW OF SECTION THRU CENTERLINE OF RUNWAYS

OBSTRUCTION TABLE					
Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
NO OBSTRUCTIONS NOTED WITHIN ANY PART 77 AIRSPACE SURFACE					



GENERAL NOTES:

1. Obstructions, clearances, and locations are established from airport runway and structure and obstacle approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, is illustrated on the PART 77 AIRSPACE PLAN, sheet 04 of these plans.
3. Depiction of features and objects within the outer portion of the approach surfaces, is illustrated on the APPROACH ZONES PROFILE, sheet 5, 6, and 7 of these plans.
4. Depiction of features and objects within the inner portion of the approach surfaces, is illustrated on the PROTECTION ZONES PLAN, sheet 5, 6, and 7 of these plans.
5. Existing and future height and hazard ordinances are to be amended and/or references upon approval of updated PART 77 AIRSPACE PLAN.

Adopted by ALUC October 2004

No.	REVISIONS	DATE	BY	APP'D
2	REVALIDATION	9/13/97	-	-
1	FAA ALP APPROVED	7/22/96	-	-

BLYTHE AIRPORT

PART 77 AIRSPACE PLAN

BLYTHE, CALIFORNIA

PREPARED BY: [illegible] P.E.

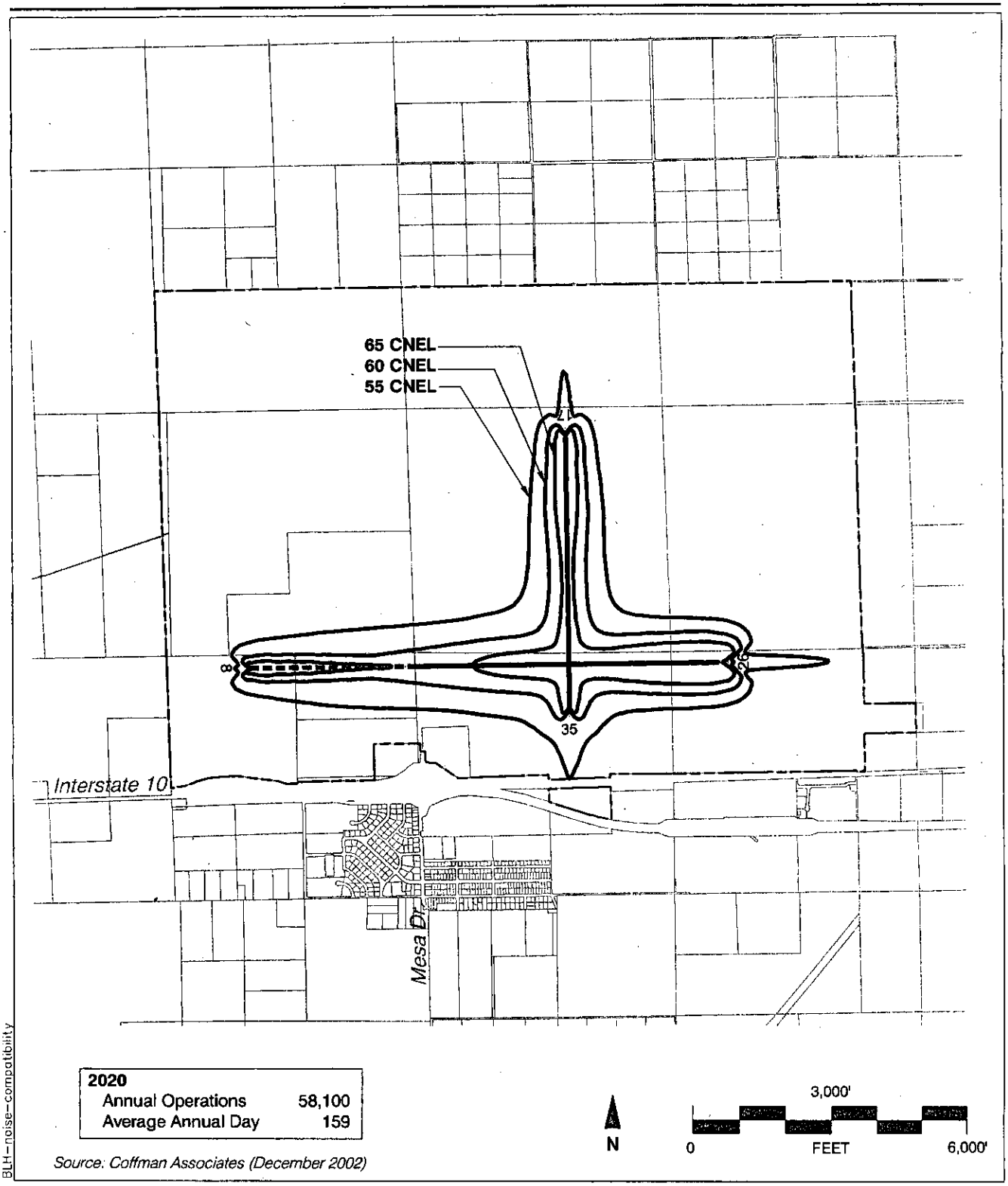
DETAILED BY: [illegible]

APPROVED BY: [illegible] P.E.

September 18, 2000 | 98027 | 4 of 9

Riverside County Airport Commission

Map BL-2



Source: Coffman Associates (December 2002)

Map BL-3

Noise Compatibility Contours

Blythe Airport

EXHIBIT 323

U.S. Department
of Transportation

**Federal Aviation
Administration**

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS

Date: July 27, 2004
Initiated by: AAS-300

AC No: 150/5200-33A
Change:

1. PURPOSE. This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICABILITY. The Federal Aviation Administration (FAA) recommends that public-use airport operators implement the standards and practices contained in this AC. The holders of Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D (Part 139), may use the standards, practices, and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. Airports that have received Federal grant-in-aid assistance must use these standards. The FAA also recommends the guidance in this AC for land-use planners, operators of non-certificated airports, and developers of projects, facilities, and activities on or near airports.

3. CANCELLATION. This AC cancels AC 150/5200-33, *Hazardous Wildlife Attractants on or near Airports*, dated May 1, 1997.

4. PRINCIPAL CHANGES. This AC contains the following major changes:

a. Reorganized outline of the AC.
b. Expanded Table 1 to include updated information from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003"*.
c. Removed Table 2, which outlined the distances between certain airport features and any on-airport agricultural crops, and relocated the discussion of on-airport agricultural activities to Paragraph 2-6.
d. Added text about the basis for separation distances between wildlife hazards and airport movement areas and added Figure 1 depicting the separation distances.
e. Added options for wetland mitigation for impacts from airport projects, including mitigation banking.
f. Further recognized the importance of the Wildlife Hazard Management Plan (WHMP).

5. BACKGROUND. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1 ranks the wildlife groups commonly involved in damaging strikes in the United States according to their relative hazard to aircraft. The ranking is based on the 47,212 records in the FAA National Wildlife Strike Database for the years 1990 through 2003. These hazard rankings, in conjunction with site-specific WHAs, will help airport operators determine the relative abundance and use patterns of wildlife species and help focus hazardous wildlife management efforts on those species most likely to cause problems at an airport.

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area (AOA). Constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports.

6. MEMORANDUM OF AGREEMENT BETWEEN FEDERAL RESOURCE AGENCIES. The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) (final signature July 2003) to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation's valuable environmental resources.

DAVID L. BENNETT
Director, Office of Airport Safety
and Standards

Table 1. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.[1]

Species group	Ranking by criteria			Composite ranking[2]	Relative hazard score[3]
	Damage[4]	Major damage[5]	Effect on flight[6]		
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39
Osprey	8	4	8	8	39
Turkey/pheasants	9	7	11	9	33
Herons	11	14	9	10	27
Hawks (buteos)	10	12	12	11	25
Gulls	12	11	13	12	24
Rock pigeon	13	10	14	13	23
Owls	14	13	20	14	23
H. lark/s. bunting	18	15	15	15	17
Crows/ravens	15	16	16	16	16
Coyote	16	19	5	17	14
Mourning dove	17	17	17	18	14
Shorebirds	19	21	18	19	10
Blackbirds/starling	20	22	19	20	10
American kestrel	21	18	21	21	9
Meadowlarks	22	20	22	22	7
Swallows	24	23	24	23	4
Sparrows	25	24	23	24	4
Nighthawks	23	25	25	25	1

[1] Excerpted from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003"*. Refer to this report for additional explanations of criteria and method of ranking.

[2] Relative rank of each species group was compared with every other group for the three variables, placing the species group with the greatest hazard rank for $\geq$ 2 of the 3 variables above the next highest ranked group, then proceeding down the list.

[3] Percentage values, from Tables 3 and 4 in Footnote 1 of the *Special Report*, for the three criteria were summed and scaled down from 100, with 100 as the score for the species group with the maximum summed values and the greatest potential hazard to aircraft.

[4] Aircraft incurred at least some damage (destroyed, substantial, minor, or unknown) from strike.

[5] Aircraft incurred damage or structural failure, which adversely affected the structure strength, performance, or flight characteristics, and which would normally require major repair or replacement of the affected component, or the damage sustained makes it inadvisable to restore aircraft to airworthy condition.

[6] Aborted takeoff, engine shutdown, precautionary landing, or other.

TABLE OF CONTENTS

SECTION 1. GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. 1
1-1. INTRODUCTION 1
1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT 1
1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT 1
1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE 1

SECTION 2. LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE. 3
2-1. GENERAL 3
2-2. WASTE DISPOSAL OPERATIONS 3
2-3. WATER MANAGEMENT FACILITIES 5
2-4. WETLANDS 6
2-5. DREDGE SPOIL CONTAINMENT AREAS 8
2-6. AGRICULTURAL ACTIVITIES 8
2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS 8
2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES 9

SECTION 3. PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS 11
3.1. INTRODUCTION 11
3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS 11
3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL 11
3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139 11
3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP) 11
3-6. LOCAL COORDINATION 12
3-7. COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS 12

SECTION 4. FAA REVIEW OF PROPOSED LAND-USE CHANGES. 13
4-1. FAA REVIEW OF PROPOSED LAND-USE CHANGES 13
4-2. WASTE MANAGEMENT FACILITIES 13
4-3. OTHER LAND-USE PRACTICE CHANGES 14

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR. . 15

SECTION 1. GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1.INTRODUCTION. When considering proposed land uses, airport operators, local planners, and developers must take into account whether the proposed land uses, including new development projects, will increase wildlife hazards. Land-use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife strikes.

The FAA recommends the minimum separation criteria outlined below for land-use practices that attract hazardous wildlife to the vicinity of airports. Please note that FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA). (See the discussion of the synergistic effects of surrounding land uses in Section 2-8 of this AC.)

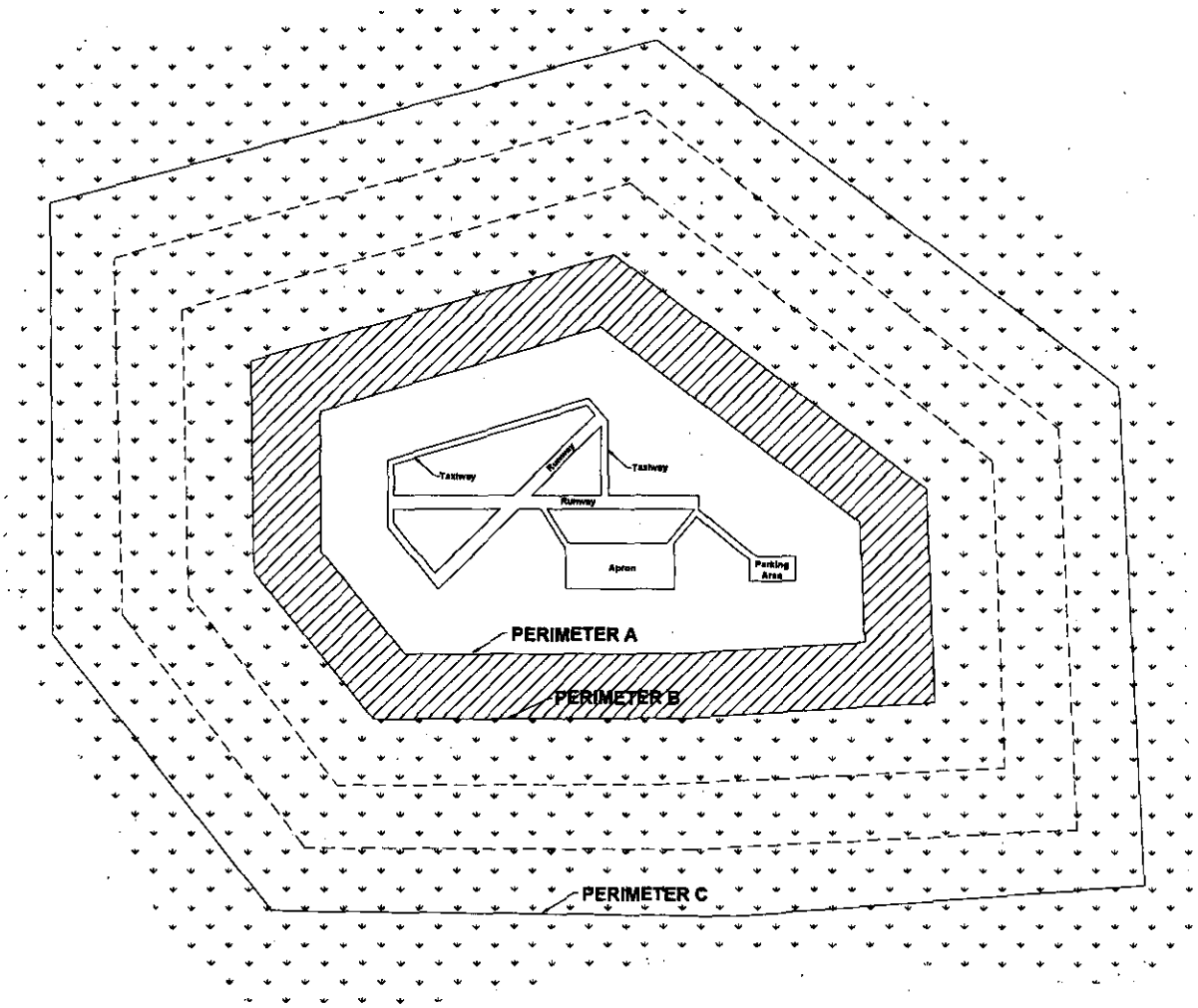
The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet and 90 percent occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

1-2.AIRPORTS SERVING PISTON-POWERED AIRCRAFT. Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance measured from the nearest aircraft operations areas.

1-3.AIRPORTS SERVING TURBINE-POWERED AIRCRAFT. Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance from the nearest aircraft movement areas.

1-4.PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE. For all airports, the FAA recommends a distance of 5 statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

Figure 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



PERIMETER A:
For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B:
For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C:
5-mile range to protect approach, departure and circling airspace.

SECTION 2. LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE.

2-1.GENERAL. The wildlife species and the size of the populations attracted to the airport environment vary considerably, depending on several factors, including land-use practices on or near the airport. This section discusses land-use practices having the potential to attract hazardous wildlife and threaten aviation safety. In addition to the specific considerations outlined below, airport operators should refer to *Wildlife Hazard Management at Airports,* prepared by FAA and U.S. Department of Agriculture (USDA) staff. (This manual is available in English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.faa.gov.). And, *Prevention and Control of Wildlife Damage,* compiled by the University of Nebraska Cooperative Extension Division. (This manual is available online in a periodically updated version at: ianrwww.unl.edu/wildlife/solutions/handbook/.)

2-2.WASTE DISPOSAL OPERATIONS. Municipal solid waste landfills (MSWLs) are known to attract large numbers of hazardous wildlife, particularly birds. Because of this, these operations, when located within the separations identified in the siting criteria in Sections 1-2 through 1-4, are considered incompatible with safe airport operations.

a. **Siting for new municipal solid waste landfills subject to AIR 21.** Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) (AIR 21) prohibits the construction or establishment of a new MSWL within 6 statute miles of certain public-use airports. Before these prohibitions apply, both the airport and the landfill must meet the very specific conditions described below. These restrictions do not apply to airports or landfills located within the state of Alaska.

   The airport must (1) have received a Federal grant(s) under 49 U.S.C. § 47101, et. seq.; (2) be under control of a public agency; (3) serve some scheduled air carrier operations conducted in aircraft with less than 60 seats; and (4) have total annual enplanements consisting of at least 51 percent of scheduled air carrier enplanements conducted in aircraft with less than 60 passenger seats.

   The proposed MSWL must (1) be within 6 miles of the airport, as measured from airport property line to MSWL property line, and (2) have started construction or establishment on or after April 5, 2001. Public Law 106-181 only limits the construction or establishment of some new MSWLs. It does not limit the expansion, either vertical or horizontal, of existing landfills.

   NOTE: Consult the most recent version of AC 150/5200-34, *Construction or Establishment of Landfills Near Public Airports,* for a more detailed discussion of these restrictions.

b. **Siting for new MSWLs not subject to AIR 21.** If an airport and MSWL do not meet the restrictions of Public Law 106-181, the FAA recommends against locating MSWLs within the separation distances identified in Sections 1-2 through 1-4. The separation distances should be measured from the closest point of the airport's AOA to the closest planned MSWL cell.

c. **Considerations for existing waste disposal facilities within the limits of separation criteria.** The FAA recommends against airport development projects that would increase the number of aircraft operations or accommodate larger or faster aircraft near MSWL operations located within the separations identified in Sections 1-2 through 1-4. In addition, in accordance with 40 CFR 258.10, owners or operators of existing MSWL units that are located within the separations listed in Sections 1-2 through 1-4 must demonstrate that the unit is designed and operated so it does not pose a bird hazard to aircraft. (See Sections 4-3(b) and 4-3(c) of this AC for a discussion of this demonstration requirement.)

d. **Enclosed trash transfer stations.** Enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ). These facilities should not handle or store putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA's definition of fully enclosed trash transfer stations. The FAA considers these facilities incompatible with safe airport operations if they are located closer than the separation distances specified in Sections 1-2 through 1-4.

e. **Composting operations on or near airport property.** Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any AOA or the distance called for by airport design requirements (see AC 150/5300-13, *Airport Design*). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic. On-airport disposal of compost by-products should not be conducted for the reasons stated in 2-3f.

f. **Underwater waste discharges.** The FAA recommends against the underwater discharge of any food waste (e.g., fish processing offal) within the separations identified in Sections 1-2 through 1-4 because it could attract scavenging hazardous wildlife.

g. **Recycling centers.** Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, or aluminum, are, in most cases, not attractive to hazardous wildlife and are acceptable.

h. **Construction and demolition (C&D) debris facilities.** C&D landfills do not generally attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, C&D landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, C&D landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities. Therefore, a C&D landfill co-located with another waste disposal operation should be located outside of the separations identified in Sections 1-2 through 1-4.

i. **Fly ash disposal.** The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they are maintained in an orderly manner, admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria outlined in Sections 1-2 through 1-4.

2-3.WATER MANAGEMENT FACILITIES. Drinking water intake and treatment facilities, stormwater and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. To prevent wildlife hazards, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of stormwater management facilities on or near all public-use airports to ensure a safe airport environment.

a. **Existing stormwater management facilities.** On-airport stormwater management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect stormwater, protect water quality, and control runoff. Because they slowly release water after storms, they create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a WHMP in accordance with Part 139, the FAA requires immediate correction of any wildlife hazards arising from existing stormwater facilities located on or near airports, using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

   Where possible, airport operators should modify stormwater detention ponds to allow a maximum 48-hour detention period for the design storm. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat.

   When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wires grids, pillows, or netting, to deter birds and other hazardous wildlife. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

   The FAA recommends that airport operators encourage off-airport stormwater treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into stormwater treatment facility operating practices when their facility is located within the separation criteria specified in Sections 1-2 through 1-4.

b. **New stormwater management facilities.** The FAA strongly recommends that off-airport stormwater management systems located within the separations identified in Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. On-airport stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period for the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages the use of underground stormwater infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

c. **Existing wastewater treatment facilities.** The FAA strongly recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport. Where required, a WHMP developed in accordance with Part 139 will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should encourage wastewater treatment facility operators to incorporate measures, developed in consultation with a wildlife damage management biologist, to minimize hazardous wildlife attractants. Airport operators should also encourage those wastewater treatment facility operators to incorporate these mitigation techniques into their standard operating practices. In addition, airport operators should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

d. **New wastewater treatment facilities.** The FAA strongly recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in Sections 1-2 through 1-4. Appendix 1 defines wastewater treatment facility as "any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes." The definition includes any pretreatment involving the reduction of the amount of pollutants or the elimination of pollutants prior to introducing such pollutants into a publicly owned treatment works (wastewater treatment facility). During the site-location analysis for wastewater treatment facilities, developers should consider the potential to attract hazardous wildlife if an airport is in the vicinity of the proposed site, and airport operators should voice their opposition to such facilities if they are in proximity to the airport.

e. **Artificial marshes.** In warmer climates, wastewater treatment facilities sometimes employ artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. The FAA strongly recommends against establishing artificial marshes within the separations identified in Sections 1-2 through 1-4.

f. **Wastewater discharge and sludge disposal.** The FAA recommends against the discharge of wastewater or sludge on airport property because it may improve soil moisture and quality on unpaved areas and lead to improved turf growth that can be an attractive food source for many species of animals. Also, the turf requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw, both of which can attract hazardous wildlife. In addition, the improved turf may attract grazing wildlife, such as deer and geese. Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

2-4. WETLANDS. Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species (Table 1).

NOTE: If questions exist as to whether an area qualifies as a wetland, contact the local division of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or a wetland consultant qualified to delineate wetlands.

a. **Existing wetlands on or near airport property.** If wetlands are located on or near airport property, airport operators should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations. At public-use airports, the FAA recommends immediately correcting, in cooperation with local, state, and Federal regulatory agencies, any wildlife hazards arising from existing wetlands located on or near airports. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

b. **New airport development.** Whenever possible, the FAA recommends locating new airports using the separations from wetlands identified in Sections 1-2 through 1-4. Where alternative sites are not practicable, or when airport operators are expanding an existing airport into or near wetlands, a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the state wildlife management agency should evaluate the wildlife hazards and prepare a WHMP that indicates methods of minimizing the hazards.

c. **Mitigation for wetland impacts from airport projects.** Wetland mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects or projects required to correct wildlife hazards from wetlands. Wetland mitigation must be designed so it does not create a wildlife hazard. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4.

(1) **Onsite mitigation of wetland functions.** The FAA may consider exceptions to locating mitigation activities outside the separations identified in Sections 1-2 through 1-4 if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge, which cannot be replicated when moved to a different location. Using existing airport property is sometimes the only feasible way to achieve the mitigation ratios mandated in regulatory orders and/or settlement agreements with the resource agencies. Conservation easements are an additional means of providing mitigation for project impacts. Typically the airport operator continues to own the property, and an easement is created stipulating that the property will be maintained as habitat for state or Federally listed species.

Mitigation must not inhibit the airport operator's ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided. The FAA will review any onsite mitigation proposals to determine compatibility with safe airport operations. A wildlife damage management biologist should evaluate any wetland mitigation projects that are needed to protect unique wetland functions and that must be located in the separation criteria in Sections 1-2 through 1-4 before the mitigation is implemented. A WHMP should be developed to reduce the wildlife hazards.

(2) **Offsite mitigation of wetland functions.** The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4 unless they provide unique functions that must remain onsite (see 2-4c(1)). Agencies that regulate impacts to or around wetlands recognize that it may be necessary to split wetland functions in mitigation schemes. Therefore, regulatory agencies may, under certain circumstances, allow portions of mitigation to take place in different locations.

(3) **Mitigation banking.** Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning. This last benefit is most helpful for airport projects, as wetland impacts mitigated outside of the separations identified in Sections 1-2 through 1-4 can still be located within the same watershed. Wetland mitigation banks meeting the separation criteria offer an ecologically sound approach to mitigation in these situations. Airport operators should work with local watershed management agencies or organizations to develop mitigation banking for wetland impacts on airport property.

2-5. DREDGE SPOIL CONTAINMENT AREAS. The FAA recommends against locating dredge spoil containment areas (also known as Confined Disposal Facilities) within the separations identified in Sections 1-2 through 1-4 if the containment area or the spoils contain material that would attract hazardous wildlife.

2-6. AGRICULTURAL ACTIVITIES. Because most, if not all, agricultural crops can attract hazardous wildlife during some phase of production, the FAA recommends against the used of airport property for agricultural production, including hay crops, within the separations identified in Sections 1-2 through 1-4. If the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport, then the airport shall follow the crop distance guidelines listed in the table titled "Minimum Distances between Certain Airport Features and Any On-Airport Agricultural Crops" found in AC 150/5300-13, *Airport Design*, Appendix 19. The cost of wildlife control and potential accidents should be weighed against the income produced by the on-airport crops when deciding whether to allow crops on the airport.

a. **Livestock production.** Confined livestock operations (i.e., feedlots, dairy operations, hog or chicken production facilities, or egg laying operations) often attract flocking birds, such as starlings, that pose a hazard to aviation. Therefore, The FAA recommends against such facilities within the separations identified in Sections 1-2 through 1-4. Any livestock operation within these separations should have a program developed to reduce the attractiveness of the site to species that are hazardous to aviation safety. Free-ranging livestock must not be grazed on airport property because the animals may wander onto the AOA. Furthermore, livestock feed, water, and manure may attract birds.

b. **Aquaculture.** Aquaculture activities (i.e. catfish or trout production) conducted outside of fully enclosed buildings are inherently attractive to a wide variety of birds. Existing aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4 must have a program developed to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should also oppose the establishment of new aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4.

c. **Alternative uses of agricultural land.** Some airports are surrounded by vast areas of farmed land within the distances specified in Sections 1-2 through 1-4. Seasonal uses of agricultural land for activities such as hunting can create a hazardous wildlife situation. In some areas, farmers will rent their land for hunting purposes. Rice farmers, for example, flood their land during waterfowl hunting season and obtain additional revenue by renting out duck blinds. The duck hunters then use decoys and call in hundreds, if not thousands, of birds, creating a tremendous threat to aircraft safety. A wildlife damage management biologist should review, in coordination with local farmers and producers, these types of seasonal land uses and incorporate them into the WHMP.

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS.

a. **Golf courses.** The large grassy areas and open water found on most golf courses are attractive to hazardous wildlife, particularly Canada geese and some species of gulls. These species can pose a threat to aviation safety. The FAA recommends against construction of new golf courses within the separations identified in Sections 1-2 through 1-4. Existing golf courses located within these separations must develop a program to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should ensure these golf courses are monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

b. **Landscaping and landscape maintenance.** Depending on its geographic location, landscaping can attract hazardous wildlife. The FAA recommends that airport operators

approach landscaping with caution and confine it to airport areas not associated with aircraft movements. A wildlife damage management biologist should review all landscaping plans. Airport operators should also monitor all landscaped areas on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

Turf grass areas can be highly attractive to a variety of hazardous wildlife species. Research conducted by the USDA Wildlife Services' National Wildlife Research Center has shown that no one grass management regime will deter all species of hazardous wildlife in all situations. In cooperation with wildlife damage management biologist, airport operators should develop airport turf grass management plans on a prescription basis, depending on the airport's geographic locations and the type of hazardous wildlife likely to frequent the airport

Airport operators should ensure that plant varieties attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass. For airport property already planted with seed mixtures containing millet, rye grass, or other large-seed producing grasses, the FAA recommends disking, plowing, or another suitable agricultural practice to prevent plant maturation and seed head production. Plantings should follow the specific recommendations for grass management and seed and plant selection made by the State University Cooperative Extension Service, the local office of Wildlife Services, or a qualified wildlife damage management biologist. Airport operators should also consider developing and implementing a preferred/prohibited plant species list, reviewed by a wildlife damage management biologist, which has been designed for the geographic location to reduce the attractiveness to hazardous wildlife for landscaping airport property.

c. **Airports surrounded by wildlife habitat.** The FAA recommends that operators of airports surrounded by woodlands, water, or wetlands refer to Section 2.4 of this AC. Operators of such airports should provide for a WHA conducted by a wildlife damage management biologist. This WHA is the first step in preparing a WHMP, where required.

d. **Other hazardous wildlife attractants.** Other specific land uses or activities (e.g., sport or commercial fishing, shellfish harvesting, etc.), perhaps unique to certain regions of the country, have the potential to attract hazardous wildlife. Regardless of the source of the attraction, when hazardous wildlife is noted on a public-use airport, airport operators must take prompt remedial action(s) to protect aviation safety.

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES. There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations; therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community when developing the WHMP.

Intentionally Left Blank

SECTION 3. PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS.

3.1. INTRODUCTION. In recognition of the increased risk of serious aircraft damage or the loss of human life that can result from a wildlife strike, the FAA may require the development of a Wildlife Hazard Management Plan (WHMP) when specific triggering events occur on or near the airport. Part 139.337 discusses the specific events that trigger a Wildlife Hazard Assessment (WHA) and the specific issues that a WHMP must address for FAA approval and inclusion in an Airport Certification Manual.

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS. The FAA will use the WHA conducted in accordance with Part 139 to determine if the airport needs a WHMP. Therefore, persons having the education, training, and expertise necessary to assess wildlife hazards must conduct the WHA. The airport operator may look to Wildlife Services or to qualified private consultants to conduct the WHA. When the services of a wildlife damage management biologist are required, the FAA recommends that land-use developers or airport operators contact a consultant specializing in wildlife damage management or the appropriate state director of Wildlife Services.

***NOTE**: Telephone numbers for the respective USDA Wildlife Services state offices can be obtained by contacting USDA Wildlife Services Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157 (http://www.aphis.usda.gov/ws/).*

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL. This manual, prepared by FAA and USDA Wildlife Services staff, contains a compilation of information to assist airport personnel in the development, implementation, and evaluation of WHMPs at airports. The manual includes specific information on the nature of wildlife strikes, legal authority, regulations, wildlife management techniques, WHAs, WHMPs, and sources of help and information. The manual is available in three languages: English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.faa.gov/. This manual only provides a starting point for addressing wildlife hazard issues at airports. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, qualified wildlife damage management biologists must direct the development of a WHMP and the implementation of management actions by airport personnel.

There are many other resources complementary to this manual for use in developing and implementing WHMPs. Several are listed in the manual's bibliography.

3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139. Part 139.337(b) requires airport operators to conduct a Wildlife Hazard Assessment (WHA) when certain events occur on or near the airport. Part 139.337 (c) provides specific guidance as to what facts must be addressed in a WHA.

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP). The FAA will consider the results of the WHA, along with the aeronautical activity at the airport and the views of the airport operator and airport users, in determining whether a formal WHMP is needed, in accordance with Part 139.337. If the FAA determines that a WHMP is needed, the airport operator must formulate and implement a WHMP, using the WHA as the basis for the plan.

The goal of an airport's Wildlife Hazard Management Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport.

The WHMP must identify hazardous wildlife attractants on or near the airport and the appropriate wildlife damage management techniques to minimize the wildlife hazard. It must also prioritize the management measures.

3-6. LOCAL COORDINATION. The establishment of a Wildlife Hazards Working Group (WHWG) will facilitate the communication, cooperation, and coordination of the airport and its surrounding community necessary to ensure the effectiveness of the WHMP. The cooperation of the airport community is also necessary when new projects are considered. Whether on or off the airport, the input from all involved parties must be considered when a potentially hazardous wildlife attractant is being proposed. Airport operators should also incorporate public education activities with the local coordination efforts because some activities in the vicinity of your airport, while harmless under normal leisure conditions, can attract wildlife and present a danger to aircraft. For example, if public trails are planned near wetlands or in parks adjoining airport property, the public should know that feeding birds and other wildlife in the area may pose a risk to aircraft.

Airport operators should work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in Sections 1-2 through 1-4. Pay particular attention to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, airport operators must ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5 miles of the airport, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife.

3-7.COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS. If an existing land-use practice creates a wildlife hazard and the land-use practice or wildlife hazard cannot be immediately eliminated, airport operators must issue a Notice to Airmen (NOTAM) and encourage the land–owner or manager to take steps to control the wildlife hazard and minimize further attraction.

SECTION 4. FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC USE AIRPORTS.

4-1. FAA REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC USE AIRPORTS.

a. The FAA discourages the development of waste disposal and other facilities, discussed in Section 2, located within the 5,000/10,000-foot criteria specified in Sections 1-2 through 1-4.

b. For projects that are located outside the 5,000/10,000-foot criteria but within 5 statute miles of the airport's AOA, the FAA may review development plans, proposed land-use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. The FAA considers sensitive airport areas as those that lie under or next to approach or departure airspace. This brief examination should indicate if further investigation is warranted.

c. Where a wildlife damage management biologist has conducted a further study to evaluate a site's compatibility with airport operations, the FAA may use the study results to make a determination.

4-2. WASTE MANAGEMENT FACILITIES.

a. **Notification of new/expanded project proposal.** Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) limits the construction or establishment of new MSWL within 6 statute miles of certain public use airports, when both the airport and the landfill meet very specific conditions. See Section 2-2 of this AC and AC 150/5200-34 for a more detailed discussion of these restrictions.

The Environmental Protection Agency (EPA) requires any MSWL operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, Section 258.10, *Airport Safety*). The EPA also requires owners or operators of new MSWL units, or lateral expansions of existing MSWL units, that are located within 10,000 feet of any airport runway end used by turbojet aircraft, or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft. (See 4-2.b below.)

When new or expanded MSWLs are being proposed near airports, MSWL operators must notify the airport operator and the FAA of the proposal as early as possible pursuant to 40 CFR 258.

b. **Waste handling facilities within separations identified in Sections 1-2 through 1-4.** To claim successfully that a waste-handling facility sited within the separations identified in Sections 1-2 through 1-4 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 2-2b. The FAA strongly recommends against any facility other than that as outlined in 2-2b (enclosed transfer stations). The FAA will use this information to determine if the facility will be a hazard to aviation.

c. **Putrescible-Waste Facilities.** In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, no such facility has been able to demonstrate an ability to reduce and sustain hazardous wildlife to levels that existed before the

putrescible-waste landfill began operating. For this reason, demonstrations of experimental wildlife control measures may not be conducted in an airport's AOA.

4-3.OTHER LAND-USE PRACTICE CHANGES. As a matter of policy, the FAA encourages operators of public use airports who become aware of proposed land use practice changes that may attract hazardous wildlife within 5 statute miles of their airports to promptly notify the FAA. The FAA also encourages proponents of such land use changes to notify the FAA as early in the planning process as possible. Advanced notice affords the FAA an opportunity (1) to evaluate the effect of a particular land-use change on aviation safety and (2) to support efforts by the airport sponsor to restrict the use of land next to or near the airport to uses that are compatible with the airport.

The airport operator, project proponent, or land-use operator may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents similar to FAA Form 7460-1 to notify the appropriate FAA Regional Airports Division Office. Project proponents can contact the appropriate FAA Regional Airports Division Office for assistance with the notification process.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land-use operator or project proponent should also forward specific details of the proposed land-use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

a. **Airports that have received Federal grant-in-aid assistance.** Airports that have received Federal grant-in-aid assistance are required by their grant assurances to take appropriate actions to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations. The FAA recommends that airport operators to the extent practicable oppose off-airport land-use changes or practices within the separations identified in Sections 1-2 through 1-4 that may attract hazardous wildlife. Failure to do so may lead to noncompliance with applicable grant assurances. The FAA will not approve the placement of airport development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants without appropriate mitigating measures. Increasing the intensity of wildlife control efforts is not a substitute for eliminating or reducing a proposed wildlife hazard. Airport operators should identify hazardous wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

b. **Additional coordination.** If, after initial review by the FAA, questions remain about the existence of a wildlife hazard near an airport, airport operators should consult a wildlife damage management biologist. Such questions may be triggered by a history of wildlife strikes at the airport or the proximity of the airport to a wildlife refuge, body of water, or similar feature known to attract wildlife. Once identified, such questions require resolution prior to the project's implementation.

APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. **GENERAL.** This appendix provides definitions of terms used throughout this AC.

   1. **Air operations area.** Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

   2. **Airport operator.** The operator (private or public) or sponsor of a public-use airport.

   3. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

   4. **Bird balls.** High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

   5. **Certificate holder.** The holder of an Airport Operating Certificate issued under Title 14, Code of Federal Regulations, Part 139.

   6. **Construct a new MSWL.** To begin to excavate, grade land, or raise structures to prepare a municipal solid waste landfill as permitted by the appropriate regulatory or permitting agency.

   7. **Detention ponds.** Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

   8. **Establish a new MSWL.** When the first load of putrescible waste is received on-site for placement in a prepared municipal solid waste landfill.

   9. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

   10. **General aviation aircraft.** Any civil aviation aircraft not operating under 14 CFR Part 119, Certification: Air Carriers and Commercial Operators.

   11. **Hazardous wildlife.** Species of wildlife (birds, mammals, reptiles), including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard

   12. **Municipal Solid Waste Landfill (MSWL).** A publicly or privately owned discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR § 257.2. An MSWL may receive other types wastes, such as commercial solid waste, non-hazardous sludge, small-quantity generator waste, and industrial solid waste, as defined under 40 CFR § 258.2. An MSWL can consist of either a stand alone unit or several cells that receive household waste.

   13. **New MSWL.** A municipal solid waste landfill that was established or constructed after April 5, 2001.

   14. **Piston-powered aircraft.** Fixed-wing aircraft powered by piston engines.

15. **Piston-use airport.** Any airport that does not sell Jet-A fuel for fixed-wing turbine-powered aircraft, and primarily serves fixed-wing, piston-powered aircraft. Incidental use of the airport by turbine-powered, fixed-wing aircraft would not affect this designation. However, such aircraft should not be based at the airport.

16. **Public agency.** A State or political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo (49 U.S.C. § 47102(15)).

17. **Public airport.** An airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft is publicly owned (49 U.S.C. § 47102(16)).

18. **Putrescible waste.** Solid waste that contains organic matter capable of being decomposed by micro-organisms and of such a character and proportion as to be capable of attracting or providing food for birds (40 CFR §257.3-8).

19. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

20. **Retention ponds.** Storm water management ponds that hold water for several months.

21. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the airport design, aircraft, type of operation, and visibility minimum.

22. **Scheduled air carrier operation.** Any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial operator for which the air carrier, commercial operator, or their representative offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 119 or as a public charter operation under 14 CFR Part 380 (14 CFR § 119.3).

23. **Sewage sludge.** Any solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (40 CFR 257.2)

24. **Sludge.** Any solid, semi-solid, or liquid waste generated form a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. (40 CFR 257.2)

25. **Solid waste.** Any garbage, refuse, sludge, from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including, solid liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by product material as defined by the Atomic Energy Act of 1954, as amended, (68 Stat. 923). (40 CFR 257.2)

26. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

27. **Turbine-use airport.** Any airport that sells Jet-A fuel for fixed-wing turbine-powered aircraft.

28. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 CFR Section 403.3 (o), (p), & (q)).

29. **Wildlife.** Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, wildlife includes feral animals and domestic animals out of the control of their owners (14 CFR Part 139, Certification of Airports).

30. **Wildlife attractants.** Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

31. **Wildlife hazard.** A potential for a damaging aircraft collision with wildlife on or near an airport.

32. **Wildlife strike.** A wildlife strike is deemed to have occurred when:
    a. A pilot reports striking 1 or more birds or other wildlife;
    b. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;
    c. Personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;
    d. Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified;
    e. The animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Transport Canada, Airports Group, *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

2. RESERVED

Intentionally Left Blank

EXHIBIT 324

United States Department of the Interior

BUREAU OF RECLAMATION
Lower Colorado Regional Office
P.O. Box 61470
Boulder City, NV 89006-1470

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

LC-4405
WTR-4.03

DEC 21 2009

DOCKET	
09-AFC-6	
DATE	DEC 21 2009
RECD.	DEC 21 2009

VIA OVERNIGHT MAIL

MEMORANDUM

To: Ms. Holly L. Roberts, Project Manager, Palm Springs-South Coast Field Office, Bureau of Land Management, 1201 Bird Center Drive, Palm Springs, California 92262

From: Steven C. Hvinden Steven C. Hvinden
Director, Boulder Canyon Operations Office

Subject: *Federal Register* Notice Dated November 23, 2009, Entitled Notice of Intent to Prepare Two Environmental Impact Statements/Staff Assessments for the Proposed Chevron Energy Solutions/Solar Millennium Palen and Blythe Solar Power Plants, Riverside County, CA and Possible Land Use Plan Amendments

The Bureau of Reclamation submits these comments in response to the United States Department of the Interior Bureau of Land Management (BLM)'s *Federal Register* notice dated November 23, 2009, (due date December 23, 2009), published at 74 Fed. Reg. 61169, and entitled "Notice of Intent to Prepare Two Environmental Impact Statements/Staff Assessments for the Proposed Chevron Energy Solutions/Solar Millennium Palen and Blythe Solar Power Plants, Riverside County, CA and Possible Land Use Plan Amendments." The notice addresses two proposed solar power plant projects (the Palen Solar Power Project and the Blythe Solar Power Project).

BLM's notice states that the site for the proposed Palen Solar Power Project is 10 miles east of Desert Center, California. The notice further states that the Palen Solar Power Project is anticipated to require approximately 1,100 acre-feet of water during construction and approximately 300 acre-feet of water per year during operation. The source of the water is stated as new wells.

The notice states that the site for the proposed Blythe Solar Power Project is 8 miles west of Blythe, California. The notice further states that the Blythe Solar Power Project is anticipated to require approximately 3,100 acre-feet of water during construction and approximately 600 acre-feet of water per year during operation. The source of the water is stated as new wells.

The Secretary of the Interior, acting through Reclamation, manages the mainstream waters of the lower Colorado River pursuant to Federal law. See the Boulder Canyon Project Act, 45 Stat. 1057 (1928) (BCPA) and the Supreme Court Decree in *Arizona* v. *California* entered March 9, 1964 (376 U.S. 340), amended February 28, 1966 (383 U.S. 268), supplemented January 9, 1979

(439 U.S. 419), April 16, 1984 (466 U.S. 144), and October 10, 2000 (531 U.S. 1), and later consolidated March 27, 2006 (547 U.S. 150 (2006)) (Consolidated Decree). In Article I of the Consolidated Decree, the Supreme Court recognizes that consumptive use of the mainstream water of the lower Colorado River may occur through underground pumping:

> (C) Consumptive use from the mainstream within a State shall include all consumptive uses of water of the mainstream, *including water drawn from the mainstream by underground pumping*, and including, but not limited to, consumptive uses made by persons, by agencies of that State, and by the United States for the benefit of Indian reservations and other federal establishments with the State;

Consolidated Decree, Article I.(C), emphasis added.

The United States Geological Survey (USGS) has conducted studies and developed a method to identify wells that, when pumped, result in water being drawn from the mainstream of the river. This methodology (referred to as the "accounting surface methodology") is described in USGS Water-Resources Investigations Report (WRIR) Nos. 94-4005 and 00-4085, published in 1994 and 2000, respectively. WRIR No. 94-4005 can be downloaded at http://pubs.er.usgs.gov/usgspubs/wri/wri944005. WRIR No. 00-4085 can be downloaded at http://az.water.usgs.gov/pubs/WRIR00-4085intro.html.

The USGS updated these reports in 2009 through publication of Scientific Investigations Report No. 2008-5113 (this report, including maps of the accounting surface, can be downloaded at http://www.usbr.gov/lc/region/programs/unlawfulusc.html). Since July of 1994, the accounting surface methodology has been and continues to be the primary tool Reclamation utilizes to determine if the use of a well does, or does not, result in a consumptive use of mainstream water from the lower Colorado River water.

If the new wells for the Palen Solar Power Project or the new wells for the Blythe Solar Power Project will draw water from the mainstream of the lower Colorado River, an entitlement to the use of Colorado River water is required by Section 5 of the BCPA and by the Consolidated Decree. An entitlement is an authorization for an individual or entity to put Colorado River water to a beneficial use pursuant to: (1) a right decreed by the United States Supreme Court; (2) a contract with the United States under Section 5 of the BCPA; or (3) a reservation of water by the Secretary.

If an entitlement is required, it must be satisfied from Colorado River water apportioned for use within the State of California by the Secretary in accordance with the terms of the Consolidated Decree. The entitlement to be used for a proposed solar project may be an existing entitlement, made available for this purpose by an existing entitlement holder either directly or through exchange.

Reclamation appreciates the opportunity to provide comments on the Palen Solar Power Project and the Blythe Solar Power Project. Please contact me at 702-293-8414 if you have questions.

cc: Ms. Sandra Owen-Joyce
Supervisory Hydrologist
United States Geological Survey
Water Science Center
520 North Park Avenue, Suite 221
Tucson, Arizona 85719-5035

EXHIBIT 325

Declaration

I, Janet M. Laurain, declare as follows:

1. I am a paralegal at Adams Broadwell Joseph & Cardozo. I make this declaration from my personal knowledge. If called as a witness, I could testify competently to facts stated in this declaration.

2. On February 3, 2010, I submitted a Public Records Act Request for all correspondence, analyses, memos, notes, electronic mail messages, files, charts, and/or other documents related to the Solar Millennium, LLC, Blythe Solar Power Project to the Colorado River Board of California.

3. On February 22, 2010, I received a response to my February 3, 2010, Public Records Act Request. Attached as Exhibit 326 is a true and correct copy of Colorado River Board of California response to CURE's PRA request.

4. The following documents were enclosed with the February 22, 2010 response:

A. Agenda, Solar Millennium, LLC/Chevron Energy Solutions Blythe and Palen Projects Meeting with the Colorado River Board of California (11/23/09), included as Exhibit 327.

B. Agenda, Solar Millennium LLC/Chevron Energy Solutions Blythe and Palen Solar Power Projects Teleconference Meeting with the Colorado River Board of California Agenda, (1/6/10), included as Exhibit 328.

C. Solar Millennium LLC Blythe & Palen Solar Power Projects presentation to Colorado River Board of California (1/6/10), included as Exhibit 329.

D. U.S. Geological Survey, Water. Resources Investigations Report, 94-4005 River, river aquifer and accounting surfaces, Blythe – Plate 15, included as Exhibit 330.

E. Colorado River Accounting Surface Map "Explanation" (map), included as Exhibit 331.

5. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this 15th day of June, 2010, at South San Francisco, California.

Janet M. Laurain

Janet M. Laurain

EXHIBIT 326

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

COLORADO RIVER BOARD OF CALIFORNIA
770 FAIRMONT AVENUE, SUITE 100
GLENDALE, CA 91203-1068
(818) 500-1625
(818) 543-4685 FAX

February 22, 2010

Ms. Janet Laurain
Environmental Paralegal
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, California 94080-7037

Dear Ms. Laurain:

In response to your letter, dated February 3, 2010, requesting copies of all correspondence, analyses, memos, notes, electronic mail messages, files, charts, maps, and/or other documents in the Colorado River Board of California's (Board) office related to the Solar Millennium, LLC, Blythe Solar Power Project, but excluding documents docketed with California Energy Commission Docket No. 09-AFC-06, I have had the staff review the Board's files regarding this subject. Enclosed is the packet of copies of relevant materials pertaining to your Public Records Act request.

If you have any questions or require additional information, please contact me at (818) 500-1625.

Sincerely,

Gerald R. Zimmerman
Executive Director

Enclosures

EXHIBIT 327

Solar Millennium, LLC / Chevron Energy Solutions
Blythe and Palen Solar Power Projects

Meeting with the Colorado River Board of California

AGENDA

November 23, 2009, Monday 1:30 – 2:30
Colorado River Board of California
770 Fairmont Avenue, Suite 100, Glendale, California 91203-1068
Phone: (818) 500-1625

Attendees:

Colorado River Board of California
Gerry Zimmerman, Executive Director
Chris Harris, Deputy Director
Abbas Amirteymoori, Principal Hydraulic Engineer
Jing-Chang Jay Chen, Ph.D., P.E., Supervising Hydraulic Engineer

Solar Millennium, LLC / Chevron Energy Solutions
Gavin Berg, Senior Project Manager, Solar Millennium, LLC[*by phone*]
Jeff Harvey, Ph.D., HCG, LLC, Consultant

---

1. **Introductions / Meeting Goals and Objectives**
   - Review Project Proposals
   - Discuss water contract applications
   - Identify next steps and schedule

BLM is preparing programmatic NEPA compliance
300 - 330 cloudless days/yr
close to neg. trans. lines
parabolic trough projects
thermal solar

2. **Project Details – Blythe and Palen Projects**
   a. Blythe Project
   b. Palen Project

3. **Water Supply Contract Applications**

4. **Action Items / Next Steps / Schedule**

only 3 projects of 11 potential are really moving forward

Palen ~500 MW
4000 ac
Dry cooling
314 AF/yr
Dec. 2013
30-yr plant life
600' deep wells

Blythe ~1000 MW, 4 242 MW plants
11000 ac
project footprint 6200 ac
Dry-cooled
614 AF/yr
400 employees
Transmission would be through a Palo Verde - Devers 500 KV II
Blythe Energy has a 230 KV line
30-yr plant life
600' deep wells

EXHIBIT 328

Solar Millennium, LLC / Chevron Energy Solutions
Blythe and Palen Solar Power Projects

AGENDA

Teleconference Meeting with the
Colorado River Board of California & Bureau of Reclamation

January 6, 2010, Wednesday 2:00 – 3:30

Dial-in Number: 1.800.444.2801
Passcode: 8684538

Attendees:

Colorado River Board of California
Gerry Zimmerman, Executive Director
Chris Harris, Deputy Director
Abbas Amirteymoori, Principal Hydraulic Engineer
Jing-Chang Jay Chen, Ph.D., P.E., Supervising Hydraulic Engineer

Bureau of Reclamation
Steve Hvinden, Area Manager, Boulder Canyon Operations Office
Nancy DiDonato, Contract and Repayment Specialist

Solar Millennium, LLC / Chevron Energy Solutions
Gavin Berg, Senior Project Manager, Solar Millennium, LLC
Alice Harron, Project Director, Solar Millennium, LLC
Scott Galati, Permitting Counsel, Galati & Blek
Jeff Harvey, Ph.D., HCG, LLC, Consultant

---

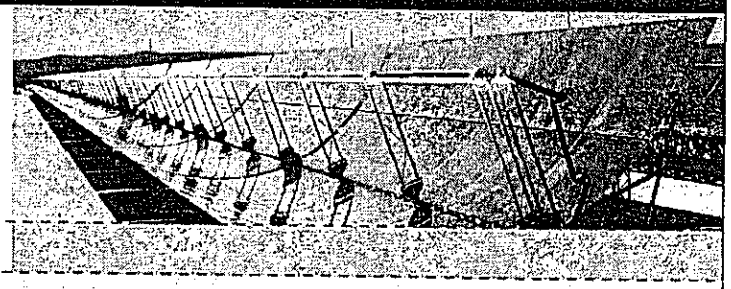
1. **Introductions / Meeting Goals and Objectives**
   - Review Project Proposals
   - Discuss CRB questions and policy issues regarding water contract applications
   - Identify next steps and schedule
2. **Review Project Details – Blythe and Palen Projects**
3. **Water Supply Contract Applications (to be amended)**
4. **Accounting Surface Question**
5. **Property Ownership & Applicant Status**
6. **Board Meeting Wednesday January 13, 2010**
7. **Action Items / Next Steps / Schedule**

EXHIBIT 329

SOLAR MILLENNIUM LLC

Solar Millennium LLC

Chevron

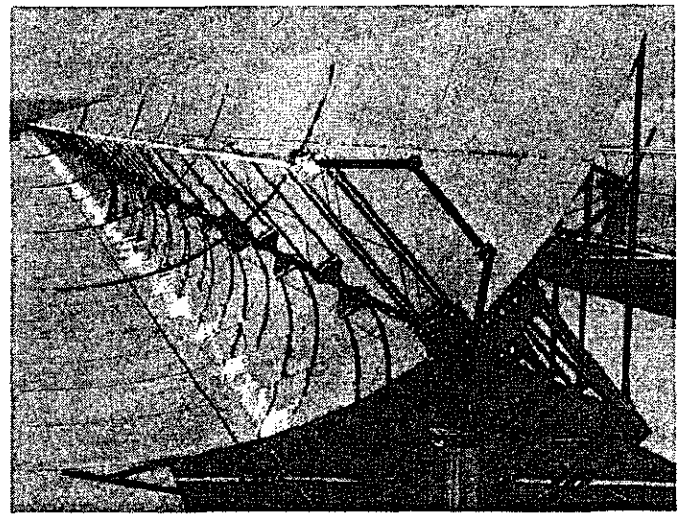


BLYTHE & PALEN SOLAR POWER PROJECTS

Colorado River Board of California
Glendale, California

January 6, 2010

MEETING AGENDA



- Introductions
- Overview of Each Project
- Water Supply Contract Applications
- Accounting Surface Question
- Property Ownership & Applicant Status
- Q & A
- Board Meeting Wednesday January 13, 2010

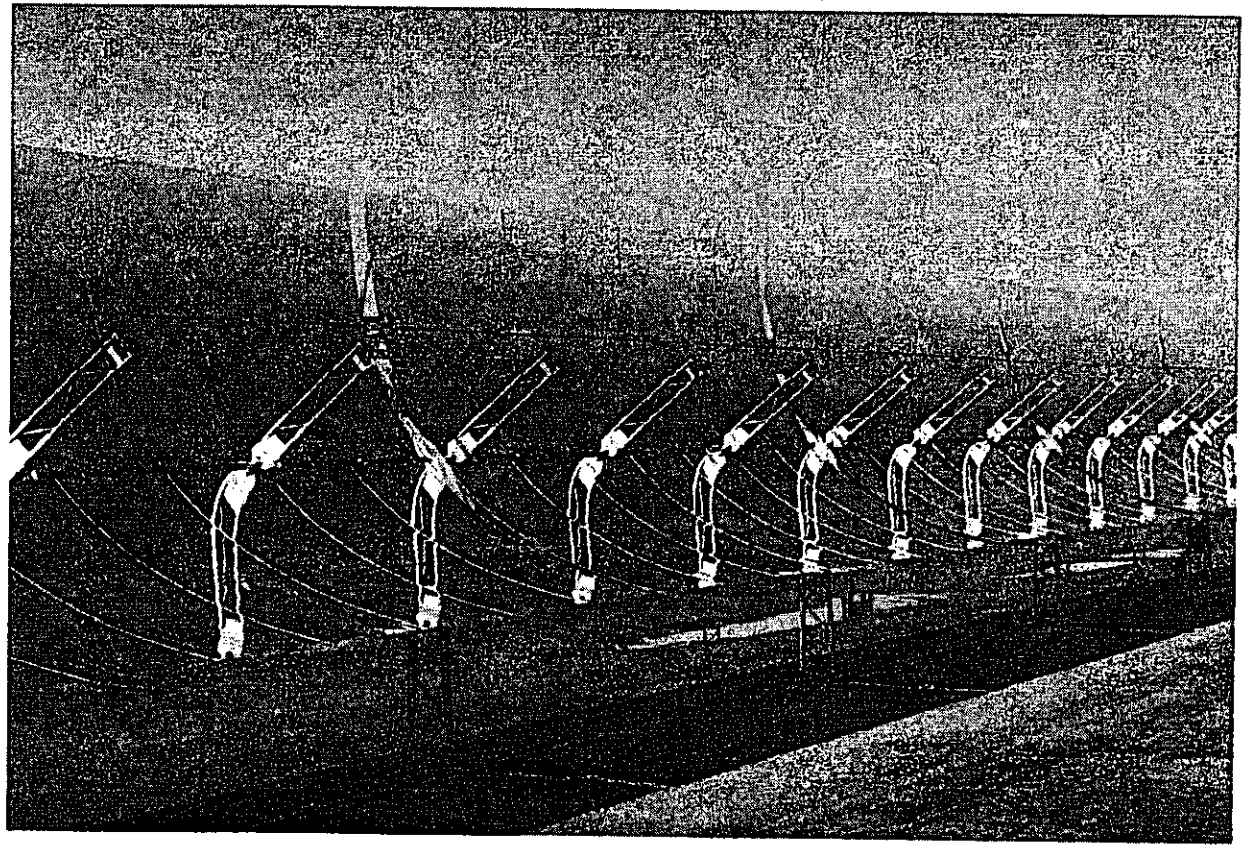
NOVEMBER 23 MEETING REVIEW

11/23/09 Agenda

- Purpose and need for Renewable Energy
- Details of Projects
- Permitting Status
- Future Accounting Surface Policy
- Water Supply Contract Applications
- Next Steps - Board Meeting 01/13/10

FEDERAL & STATE ENTITLEMENTS

- Bureau of Land Management (BLM): Entitlement applied for is a **Utility ROW** - a private party property right - to develop a specific project on federal lands – EIS in process
- California Energy Commission (CEC): Entitlement applied for is a private entity license to construct and operate a thermal solar power plant (*BLM is not a party to the license*) – EIR/AFC in process



PROJECTS OVERVIEW

BLYTHE & PALEN SOLAR POWER PROJECTS

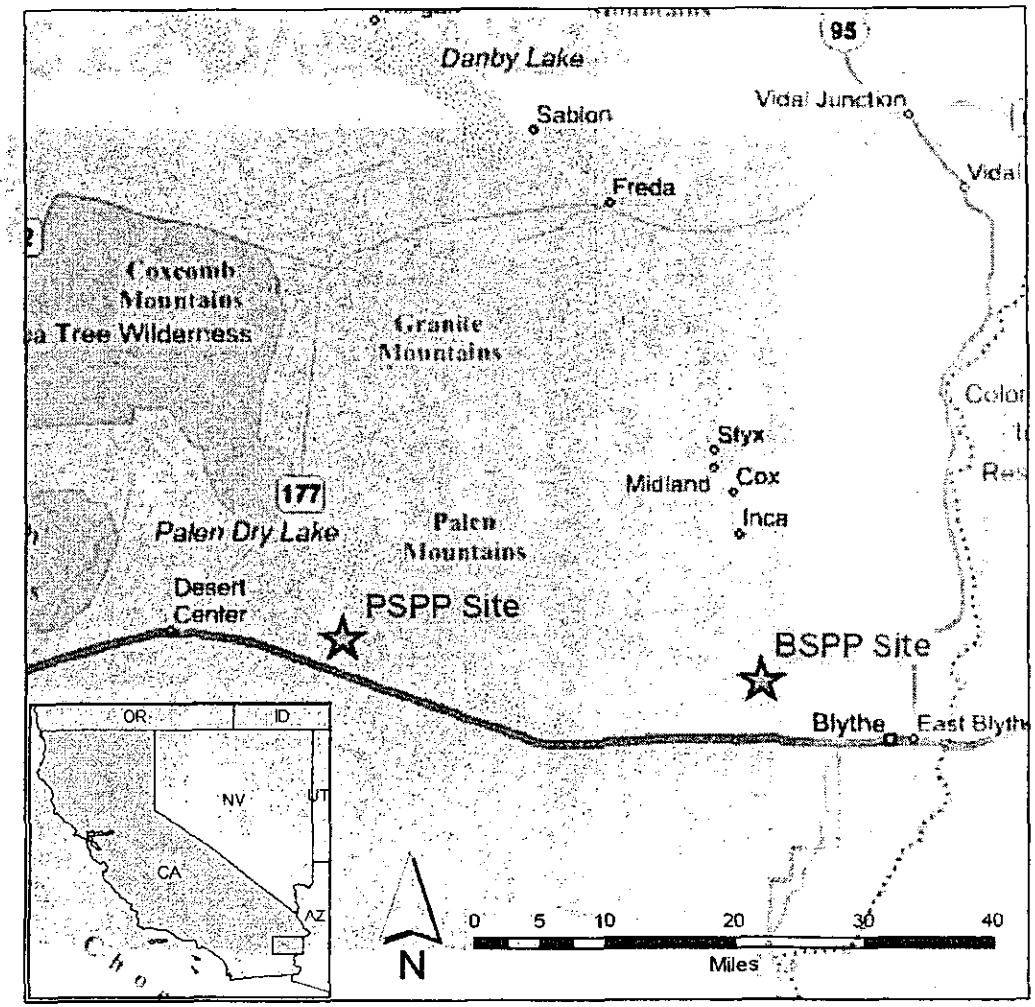
Location:

Palen Project

- Chuckwalla Valley
- east of Desert Center
- north of I-10.

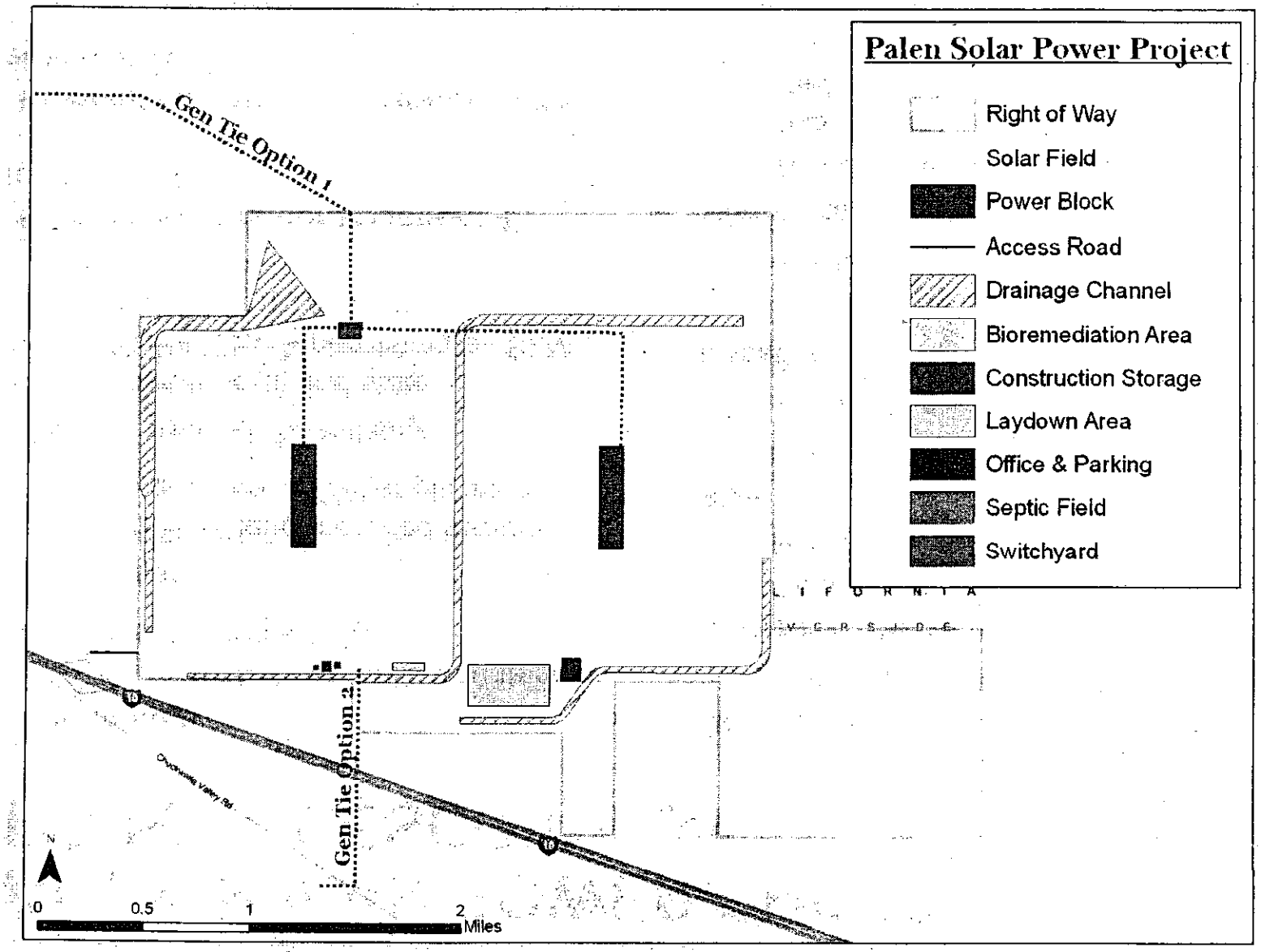
Blythe Project

- Palo Verde Mesa
- west of City of Blythe
- north of I-10 and Blythe AP



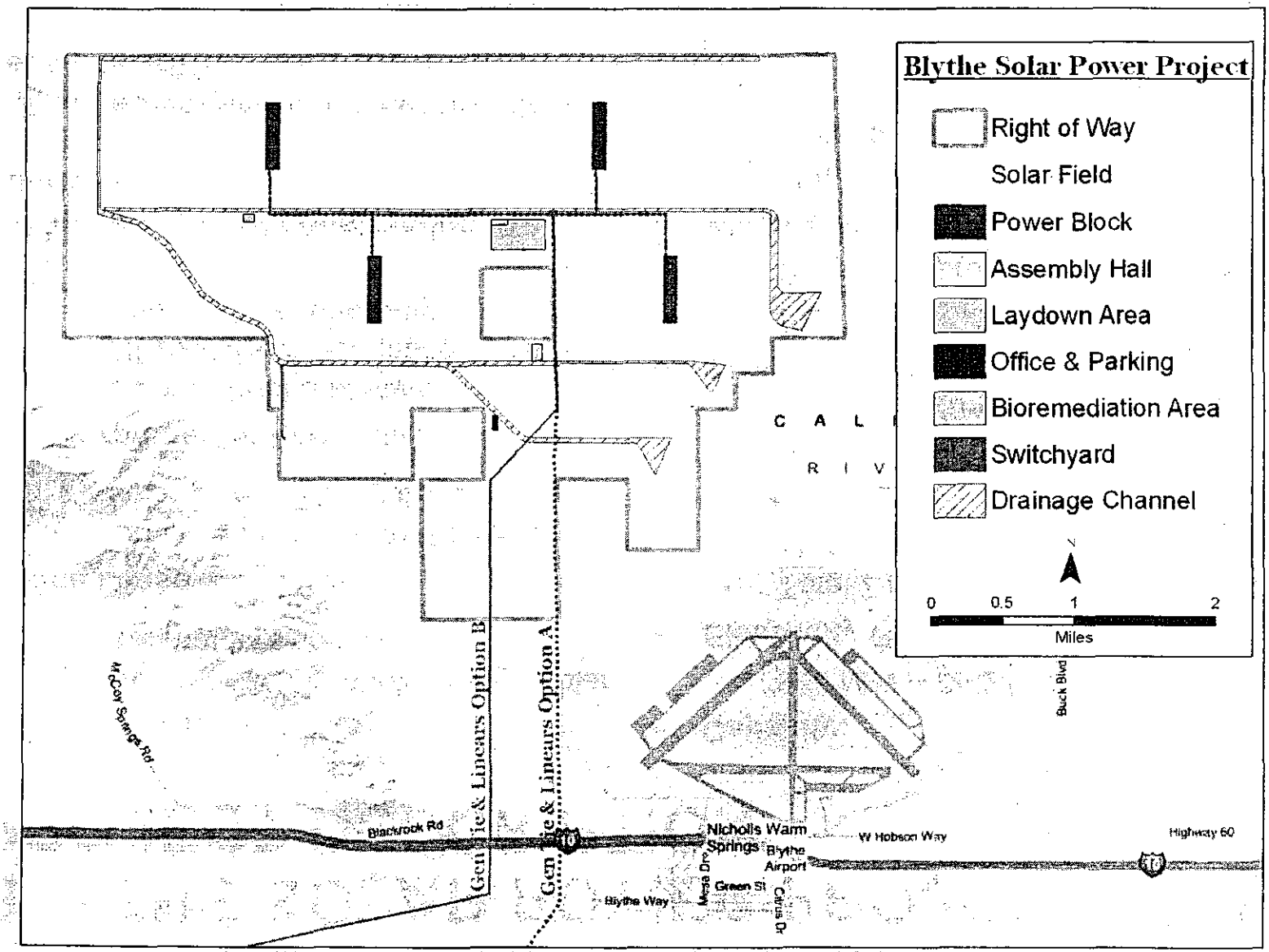
PALEN SOLAR POWER PROJECT: PROJECT DESCRIPTION

- **Technology**
  - Commercial parabolic trough solar thermal technology
- **Site Lease**
  - On BLM land, secured through solar power ROW application.
- **Environmental Permitting**
  - Joint federal and state NEPA/CEQA permitting by BLM and CEC, respectively.
- **Planned start of construction: 4th Quarter 2010**
- **Planned commercial inception date: December 2013**
- **Capacity**
  - 484 MW (2 X 242 MW)
- **Electricity Production**
  - Total 1 million MWh/year (550,000 MWh/year/plant) = 150,000 homes
- **Size**
  - Total ROW: 5,200 acres
  - Footprint: 3,900 acres
- **Location**
  - 10 miles east of Desert Center, CA
  - 1 mile North of Highway I-10
- **Water consumption**
  - Mirror washing, feedwater, potable, dust control – approx 314 acre feet/year
  - Project will be dry-cooled


Palen Solar Power Project
Right of Way
Solar Field
Power Block
Access Road
Drainage Channel
Bioremediation Area
Construction Storage
Laydown Area
Office & Parking
Septic Field
Switchyard
Gen Tie Option 1
Gen Tie Option 2
10
0
0.5
1
2
Miles
N

BLYTHE SOLAR POWER PROJECT: PROJECT DESCRIPTION

- **Technology**
  - Commercial parabolic trough solar thermal technology
- **Site Lease**
  - On BLM land, secured through solar power ROW application.
- **Environmental Permitting**
  - Joint federal and state NEPA/CEQA permitting by BLM and CEC, respectively.
- **Planned start of construction: 4th Quarter 2010**
- **Planned commercial inception date: December 2013**
- **Capacity:**
  - 968 MW – (242 MW x 4)
- **Electricity Production:**
  - Total 2 million MWh/year (550,000 MWh/plant/year) = 300,000 homes
- **Location:**
  - 8 miles west of Blythe, CA; 3 miles north of Highway I-10
- **Size:**
  - ROW: approx. 9,400 acres
  - Project: approx. 6,000 acres
- **Water consumption**
  - Mirror washing, feedwater, potable, dust control – approximately 614 acre feet/year
  - Project will be dry-cooled


Blythe Solar Power Project
Right of Way
Solar Field
Power Block
Assembly Hall
Laydown Area
Office & Parking
Bioremediation Area
Switchyard
Drainage Channel
N
0
0.5
1
2
Miles
Gen Tie & Linears Option B
Gen Tie & Linears Option A
McCoy Springs Rd
Blackrock Rd
10
Nicholls Warm Springs
Blythe Airport
W Hobson Way
Highway 60
Buck Blvd
Mesa Dr
Green St
Blythe Way
Citrus Dr

Applications to the Lower Colorado River Board of California

For Lower Colorado Water Supply Project Water

By Solar Millennium

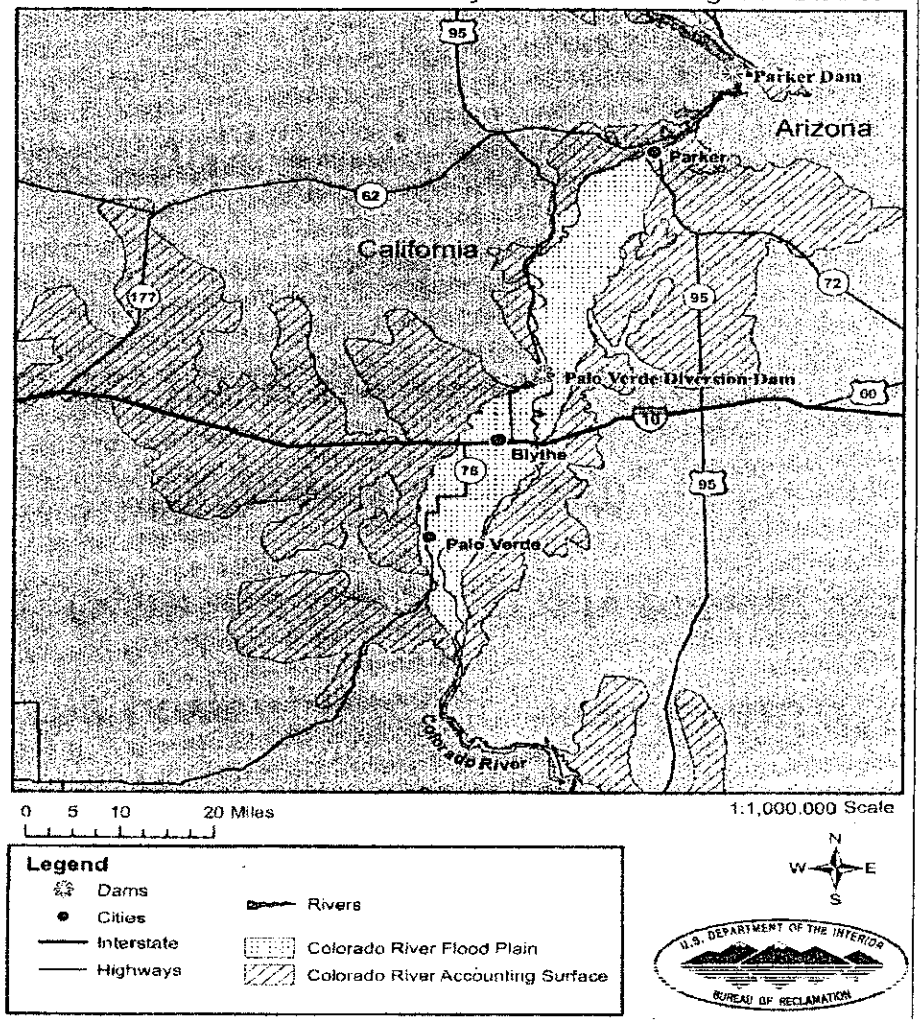
for the Palen Solar Power Project

and

the Blythe Solar Power Project

WATER SUPPLY CONTRACT APPLICATIONS

Figure 5 – Lower Colorado River Floodplain and Accounting Surface: Parker Dam to Southern Boundary of Palo Verde Irrigation District



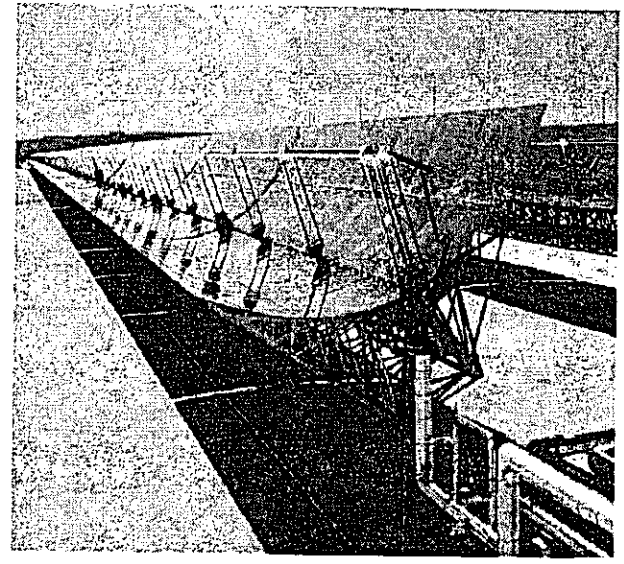
ACCOUNTING SURFACE SPECIFICS

Palen Solar Power Project:

- Chuckwalla Valley Aquifer
- Initial pumping above accounting surface
- Long term pumping may be below accounting surface
- Cumulative pumping likely to be below accounting surface

Blythe Solar Power Project:

- Palo Verde Mesa Aquifer
- Initial and long term pumping below the accounting surface



PALEN SOLAR POWER PROJECT: WATER USE

Annual Numeric Volume of Water Proposed to be Diverted Under Subcontract with the City of Needles			
Project Year[1]	**Water Use (AF)** ***Construction[2]***	**Water Use (AF)** ***Operations[3]***	**Total Annual Water Need**
2010	80	0	80
2011	500	0	500
2012	500	0	500
2013	480	314	794
2014-2040	0	314	314

1. Assumes 30-year license and land ROW approved in 2010.
2. Assumes construction begins late 2010. Estimated annual construction water need averaged over 39 month construction period.
3. Two equivalent power generation units to be developed and fully operational in 2013.

BLYTHE SOLAR POWER PROJECT: WATER USE

Annual Numeric Volume of Water Proposed to be Diverted Under Subcontract with the City of Needles			
Project Year[1]	**Water Use (AF)** ***Construction[2]***	**Water Use (AF)** ***Operations[3]***	**Total Annual Water Need**
2010	100	0	100
2011	558	0	558
2012	558	0	558
2013	558	307	865
2014	558	460	1018
2015	558	614	1172
2016	274	614	888
2017-2040	0	614	614

1. Assumes 30-year license and land ROW approved in 2010.
2. Assumes construction begins late 2010. Estimated annual construction water need averaged over 69 month construction period.
3. Four equivalent power generation units to be developed in phases, with first phase operational in 2013, and full operations by 2016

DISCUSSION OF POLICY ISSUES

- Status of Accounting Surface Policy
- Need for LCR Water Supply Contract
- Solar Millennium as first (and at this time the only) applicant
- Renewable energy development hurdles
- ROW on federal lands is a private property right
- Solar power development is a private development – no BLM interest or sponsorship

OPEN ITEMS

- CRB Staff analysis and likely recommendation?
- Bureau of Reclamation policy direction?

For more information, please contact us at:

Gavin Berg
Solar Millennium LLC
berg@solarmillennium.com
(510) 524-4517

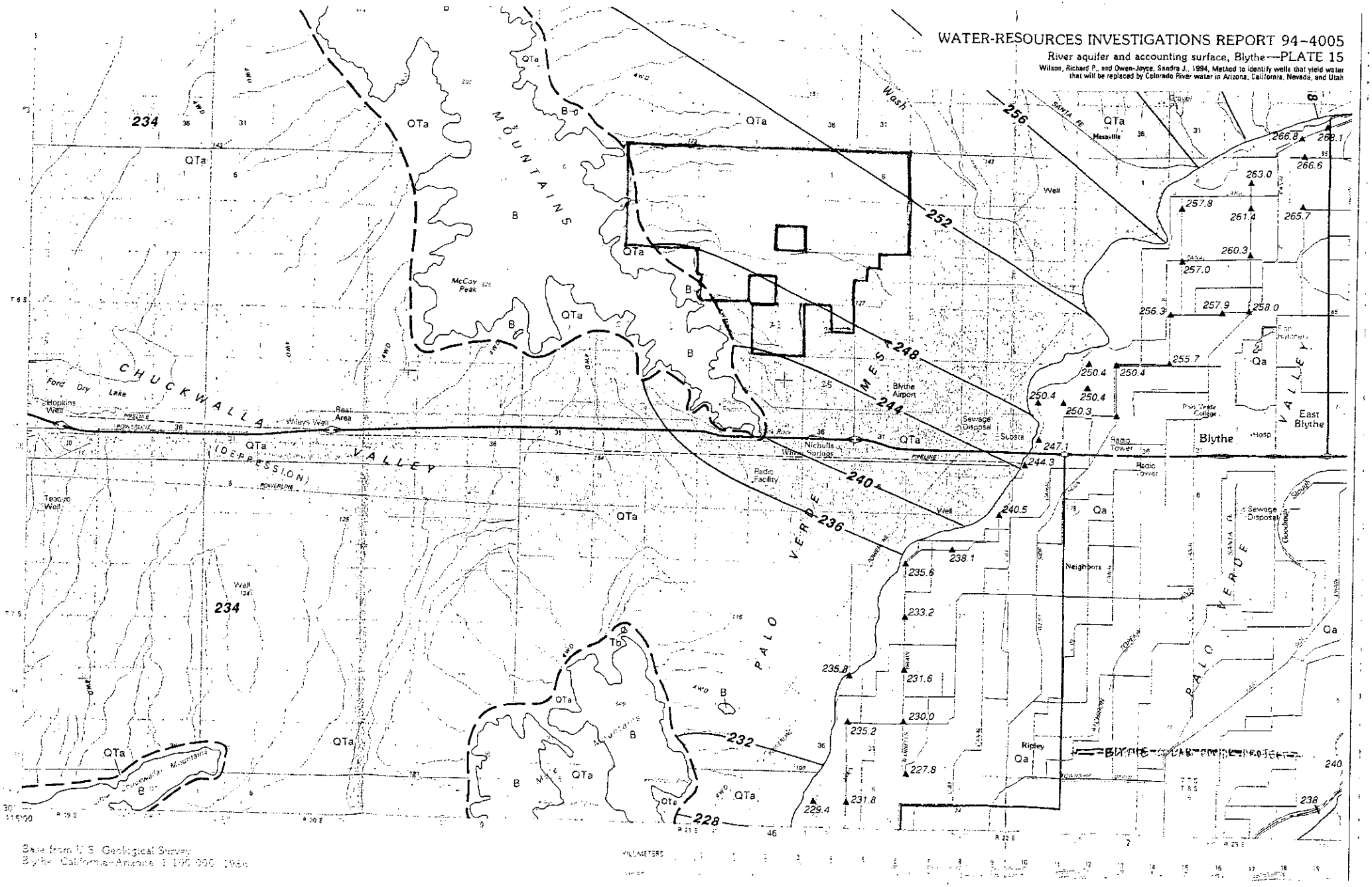
Jeff Harvey
(916) 799-6065
Jeff@Harvey-Meyerhoff.com

EXHIBIT 330

WATER-RESOURCES INVESTIGATIONS REPORT 94-4005

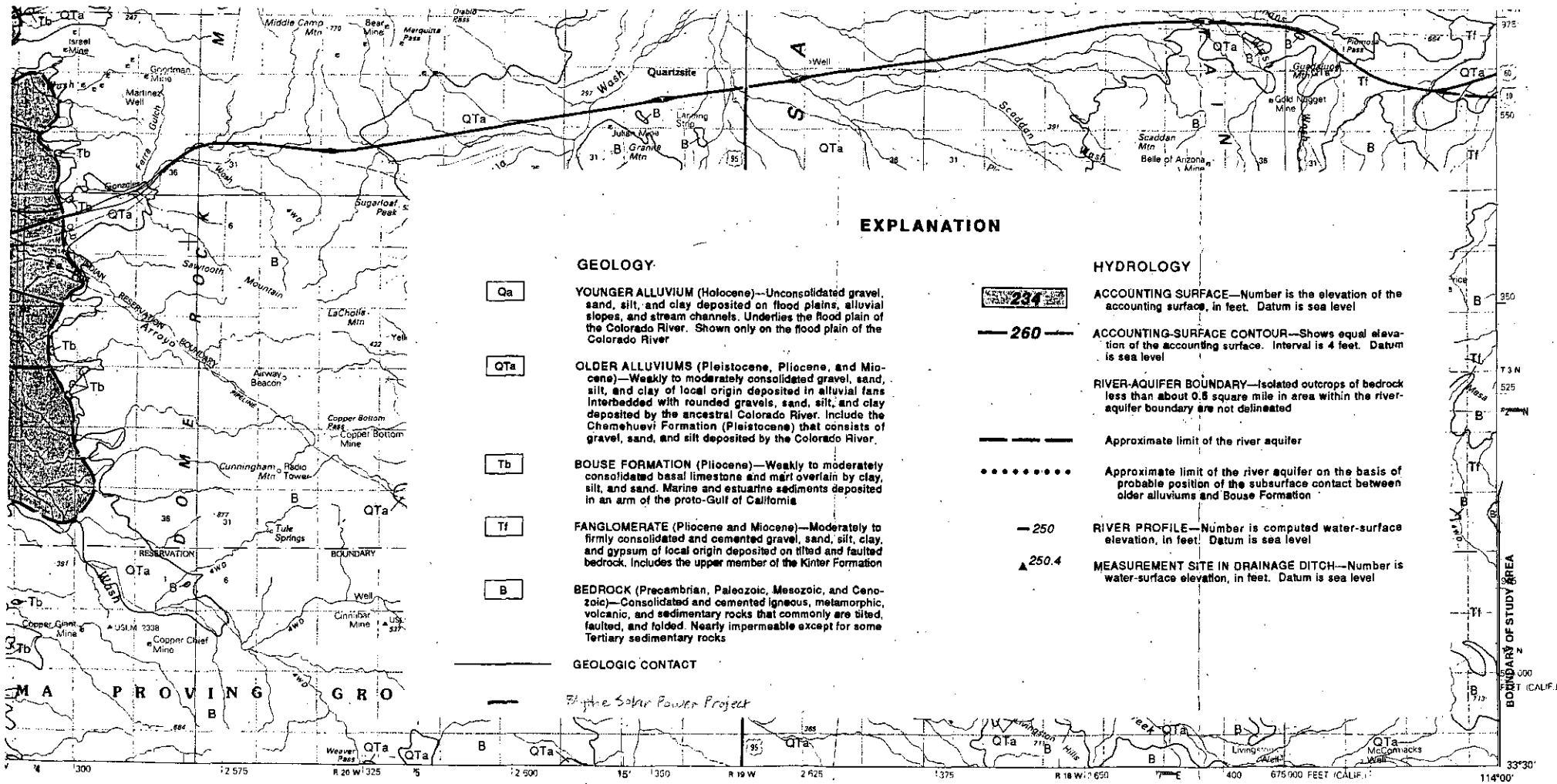
River aquifer and accounting surface, Blythe—PLATE 15

Wilson, Richard P., and Owen-Joyce, Sandra J., 1994, Method to identify wells that yield water that will be replaced by Colorado River water in Arizona, California, Nevada, and Utah



Base from U.S. Geological Survey
Blythe, California-Arizona, 1:100,000, 1956

EXHIBIT 331



EXPLANATION

GEOLOGY

Qa — YOUNGER ALLUVIUM (Holocene)—Unconsolidated gravel, sand, silt, and clay deposited on flood plains, alluvial slopes, and stream channels. Underlies the flood plain of the Colorado River. Shown only on the flood plain of the Colorado River

QTa — OLDER ALLUVIUMS (Pleistocene, Pliocene, and Miocene)—Weakly to moderately consolidated gravel, sand, silt, and clay of local origin deposited in alluvial fans interbedded with rounded gravels, sand, silt, and clay deposited by the ancestral Colorado River. Include the Chemehuevi Formation (Pleistocene) that consists of gravel, sand, and silt deposited by the Colorado River.

Tb — BOUSE FORMATION (Pliocene)—Weakly to moderately consolidated basal limestone and marl overlain by clay, silt, and sand. Marine and estuarine sediments deposited in an arm of the proto-Gulf of California

Tf — FANGLOMERATE (Pliocene and Miocene)—Moderately to firmly consolidated and cemented gravel, sand, silt, clay, and gypsum of local origin deposited on tilted and faulted bedrock. Includes the upper member of the Kinter Formation

B — BEDROCK (Precambrian, Paleozoic, Mesozoic, and Cenozoic)—Consolidated and cemented igneous, metamorphic, volcanic, and sedimentary rocks that commonly are tilted, faulted, and folded. Nearly impermeable except for some Tertiary sedimentary rocks

GEOLOGIC CONTACT

Blythe Solar Power Project

HYDROLOGY

234 — ACCOUNTING SURFACE—Number is the elevation of the accounting surface, in feet. Datum is sea level

260 — ACCOUNTING-SURFACE CONTOUR—Shows equal elevation of the accounting surface. Interval is 4 feet. Datum is sea level

RIVER-AQUIFER BOUNDARY—Isolated outcrops of bedrock less than about 0.5 square mile in area within the river-aquifer boundary are not delineated

Approximate limit of the river aquifer

Approximate limit of the river aquifer on the basis of probable position of the subsurface contact between older alluviums and Bouse Formation

250 — RIVER PROFILE—Number is computed water-surface elevation, in feet. Datum is sea level

▲250.4 — MEASUREMENT SITE IN DRAINAGE DITCH—Number is water-surface elevation, in feet. Datum is sea level

CONVERSION TABLE

Meters	Feet
1	3.2808
2	6.5617
3	9.8425
4	13.1234
5	16.4042
6	19.6850
7	22.9659
8	26.2467
9	29.5276
10	32.8084

To convert meters to feet multiply by 3.2808

To convert feet to meters multiply by 0.3048

DECLINATION DIAGRAM

GN — MN

1°23' / 25 MILS

13¼° / 240 MILS

UTM grid convergence (GN) and 1988 magnetic declination (MN) at center of map. Diagram is approximate

ADJOINING MAPS

1	2	3
4		5
6	7	8

1 Sheep Hole Mts.
2 Parker
3 Alamo Lake
4 Eagle Mountains
5 Salome
6 Salton Sea
7 Trigo Mountains
8 Little Horn Mts.

LORADO RIVER VALLEY

EXHIBIT 332

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

COLORADO RIVER BOARD OF CALIFORNIA
770 FAIRMONT AVENUE, SUITE 100
GLENDALE, CA 91203-1068
(818) 500-1625
(818) 543-4685 FAX

DOCKET
09-AFC-6
DATE MAR 22 2010
RECD. APR 01 2010

March 22, 2010

Mr. Alan H. Solomon
Project Manager
Siting, Transmission and Environmental
Protection Division
California Energy Commission
1516 Ninth Street, MS 15
Sacramento, CA 95814-5512

Dear Mr. Solomon:

The Colorado River Board of California (Board), created in 1937, is the State agency charged with safeguarding and protecting the rights and interests of the State, its agencies and citizens, in the water and power resources of the seven-state Colorado River System.

The Board has received and reviewed the California Energy Commission's (CEC) documents Nos. Docket 09-AFC-6 and 09-AFC-7: Request for Agency Participation in the Review of the Blythe and the Palen Solar Power Projects in Riverside County, California, Distribution of Application for Certification. Both the Blythe and the Palen Solar Power Projects are proposed to be located in the Southern California inland desert. The applicants for both the Blythe and the Palen Projects are seeking a right-of-way grant for approximately 9,400 acres and 5,200 acres, respectively, of Federal lands that are administered by the Bureau of Land Management (BLM). The total water consumption during the operational period for the Blythe and the Palen Projects is estimated to be 628 and 314 acre-feet per year over the 30-year license period, respectively. In addition during construction, the water use is estimated to be 3,164 and 1,560 acre-feet for the two projects, respectively. The water supply for each project will be pumped groundwater from on-site wells.

According to the Consolidated Decree of the Supreme Court of the United States in the case of *Arizona v. California, et al.* entered March 27, 2006, (547 U.S. 150 (2006)), the consumptive use of water means "diversion from the stream less such return flow thereto as is available for consumptive use in the United States or in satisfaction of the Mexican treaty obligation" and consumptive use "includes all consumptive uses of water of the mainstream, including water drawn from the mainstream by underground pumping." Also, pursuant to the 1928 Boulder Canyon Project Act (BCPA) and the Consolidated Decree, no water shall be delivered from storage or used by any water user without a valid contract between the Secretary of the Interior and the water user for such use, i.e., through a BCPA Section 5 contract. Within California, BCPA Section 5 contracts have previously been entered into between users of Colorado River mainstream water and the Secretary of the Interior for water from the Colorado River that exceeds California's basic entitlement to use Colorado River water as set forth in the Consolidated Decree. Thus, no additional Colorado River water is available for use by new

PROOF OF SERVICE (REVISED 4/5/10) FILED WITH
ORIGINAL MAILED FROM SACRAMENTO ON 4/15/10
HA

project proponents along the Colorado River, except through the contract of an existing BCPA Section 5 contract holder, either by direct service or through an exchange of non-Colorado River water for Colorado River water.

The Federal lands proposed for both the Blythe and Palen Projects are located within the "Accounting Surface" area designated by U.S. Geological Survey Water Investigation Report Nos. 94-4005 and 00-4085 (USGS Report). This USGS Report indicates that the aquifer underlying lands located within the "Accounting Surface" is considered hydraulically connected to the Colorado River and groundwater withdrawn from lands underlying the "Accounting Surface" would be replaced by Colorado River water, in total or in part. This means that if it is determined that these wells are, in fact, pumping Colorado River water, a contract with the Secretary of the Interior is required before such a use is deemed to be a legally authorized use of this groundwater.

On November 9, 2009, the Board received applications for Lower Colorado Water Supply Project water for the Blythe and the Palen Solar Power Projects from the projects' consultant/proponent, Mr. Josef Eichhammer of Solar Millennium, LLC. This project, enacted by Congress on November 14, 1986, as the Lower Colorado Water Supply Project Act of 1986 (Act) authorized construction of the Lower Colorado Water Supply Project (LCWSP) and appropriated funds for the U.S. Bureau of Reclamation (Reclamation) to construct Phase I of the Project. The LCWSP consists of well field facilities in the Sand Hills along the All-American Canal in Imperial County. The LCWSP is authorized to provide exchange water up to a total amount of 10,000 acre-feet per year for nonagricultural use to those users of Colorado River water along the Colorado River, who do not have an existing Section 5 BCPA contractual entitlement or whose entitlement to use Colorado River is insufficient to meet their needs. Under a "first come first serve" priority basis, the Board has reviewed applications that it has received and, to date, recommended to Reclamation that applicants for LCWSP water in the amount of about 7,500 acre-feet per year are eligible to receive LCWSP water. At this time, the capacity to pump the fully authorized volume of 10,000 acre-feet of water per year has not been constructed. Furthermore, when the Congress passed the Act authorizing the LCWSP, water for large scale solar power/energy projects was not envisioned. Considering these two factors it does not appear that LCWSP water is a viable option for the Blythe and Palen Projects.

Based upon the applications for LCWSP water that were received from Solar Millennium for the Blythe and the Palen Solar Power Projects, several meetings and telephone conference calls have been held among the solar power projects consultants/proponents, Reclamation, BLM, Board's staff, and others. As a result of discussions in these meetings, the Board's staff has identified a preferred option for obtaining a legally authorized and reliable water supply for both the Blythe and the Palen Solar Power Projects over the life of the project that fits into the timeframe that has been established by Solar Millennium. That option involves obtaining water through an existing Section 5 BCPA contract holder, The Metropolitan Water District of Southern California (MWD). Although other options may be available, they, in the Board's opinion, could not be implemented in a timely manner and address the requirement that water consumptively used

from the Colorado River must be through a Section 5 BCPA contractual entitlement.

If you have any questions or need further information, please contact me at (818) 500-1625.

Sincerely,

Gerald R. Zimmerman
Executive Director

cc: Ms. Lorri Gray-Lee, Regional Director, Lower Colorado Region, U.S. Bureau of Reclamation
Ms. Holly Roberts, Associate Field Manager, Palm Springs-South Coast Field Office, BLM
Ms. Eileen Allen, Manager, Energy Facilities Siting and Dockets Office, CEC
Dr. Jeffrey G. Harvey, Principal & Senior Scientist, Harvey Meyerhoff Consulting Group
Mr. Gavin Berg, Project Manager, Solar Millennium LLC
Mr. William J. Hasencamp, Manager, Colorado River Resources, The Metropolitan Water District of Southern California

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 *BLYTHE SOLAR POWER PLANT PROJECT*

Docket No. 09-AFC-6

PROOF OF SERVICE
(Revised 3/3/10)

APPLICANT
Alice Harron
Senior Director of Project Development
1625 Shattuck Avenue, Suite 270
Berkeley, CA 94709-1161
harron@solarmillennium.com

***Elizabeth Ingram, Associate Developer, Solar Millennium, LLC**
1625 Shattuck Avenue
Berkeley, CA 94709
ingram@solarmillennium.com

Carl Lindner
AECOM Project Manager
1220 Avenida Acaso
Camarillo, CA 93012
carl.lindner@aecom.com

***Ram Ambatipudi**
Chevron Energy Solutions
150 E. Colorado Blvd., Ste. 360
Pasadena, CA 91105
rambatipudi@chevron.com

Co-COUNSEL
Scott Galati, Esq.
Galati/Blek, LLP
455 Capitol Mall, Suite 350
Sacramento, CA 95814
sgalati@gb-llp.com

Co-COUNSEL
Peter Weiner
Matthew Sanders
Paul, Hastings, Janofsky & Walker LLP
55 2nd Street, Suite 2400-3441
San Francisco, CA 94105
peterweiner@paulhastings.com
matthewsanders@paulhastings.com

INTERESTED AGENCIES
California ISO
e-recipient@caiso.com

Holly L. Roberts, Project Manager
Bureau of Land Management
Palm Springs-South Coast Field Office
1201 Bird Center Drive
Palm Springs, CA 92262 Office
CAPSSolarBlythe@blm.gov

INTERVENORS
California Unions for Reliable Energy (CURE)
c/o: Tany A. Gulesserian,
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gate Way Boulevard,
Suite 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

ENERGY COMMISSION
KAREN DOUGLAS
Chairman and Presiding Member
kldougla@energy.state.ca.us

ROBERT WEISENMILLER
Commissioner and Associate Member
rweisenm@energy.state.ca.us

Raoul Renaud
Hearing Officer
rrenaud@energy.state.ca.us

Alan Solomon
Siting Project Manager
asolomon@energy.state.ca.us

Lisa DeCarlo
Staff Counsel
ldecarlo@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, Hilarie Anderson, declare that on April 15, 2010, I served and filed a copy of the attached Letter from the Colorado River Board of California. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[http://www.energy.ca.gov/sitingcases/solar_millennium_blythe]**

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:

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

_____ by personal delivery;

__✓__ by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

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

OR

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

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

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

Original Signature in Dockets
Hilarie Anderson

EXHIBIT 333

STATE OF CALIFORNIA

California Energy Commission

In the Matter of: The Application for Certification for the Blythe Solar Power Project	Docket No. 09-AFC-6

TESTIMONY OF MATTHEW F. HAGEMANN ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT

June 11, 2010

Elizabeth Klebaner
Tanya A. Gulesserian
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
(650) 589-1660 Voice
(650) 589-5062 Facsimile
eklebaner@adamsbroadwell.com

Attorneys for CALIFORNIA UNIONS FOR RELIABLE ENERGY

I. INTRODUCTION

I have been working for California Unions for Reliable Energy ("CURE") as a consultant since the data adequacy phase of the Blythe Solar Power Project ("Project" or "BSPP") proceeding. I have reviewed the Application for Certification ("AFC"), the Applicant's responses to the California Energy Commission Staff's data requests, the Staff Assessment and Draft Environmental Impact Statement ("Staff Assessment"), and the Revised Staff Assessment. I have also conducted my own independent investigations and analyses regarding the Project's potential environmental and health and safety impacts.

My testimony is based on the activities described above and the knowledge and experience I have acquired during more than 25 years of working on environmental issues. A summary of my education and experience is attached to this testimony as Attachment 1.

II. THE STAFF ASSESSMENT AND THE APPLICANT'S SUBMITTALS FAIL TO IDENTIFY BASELINE CONDITIONS AND THE ONGOING FEDERAL CLEANUP ACTIVITIES ON THE PROJECT SITE

The AFC and the Staff Assessment fail to accurately describe the existing physical conditions on and around the Project site and fail to identify the fact that portions of the Project site are now subject to federal cleanup activities under the Defense Environmental Restoration Program (DERP).

A. Prior Military Activities at the Project Site and its Vicinity

The Project footprint would encompass approximately 5,950 acres within a 9,400 acre right-of-way from the U.S. Bureau of Land Management (BLM).[1] The site includes about 7,030 acres that would be disturbed in some manner during construction and operation of the Project.[2] The Blythe Airport is south and east of the Project footprint.[3] The Blythe Airport is now leased by the City of Blythe from Riverside County; however, the Blythe Airport site and its surroundings were previously occupied and used by the U.S. Army.

---

[1] Staff Assessment, p. C.6-4.
[2] *Id.*
[3] *Id.*

On June 1, 1942, the U.S. Army entered into a lease with the County of Riverside to acquire use of 290.45 acres (later determined to be 282.61 acres), corresponding to the Blythe Airport.[4] Between 1942 and 1944 a total of 2,354.89 acres of public domain land were transferred to the War Department and all desert claims cleared through declaration of taking.[5] Additionally, the U.S. Army acquired another 1,896.04 acres in fee from various private parties.[6] A total of 6.54 acres of public domain land were acquired for right-of-ways as well as a 1.98 acre easement and 0.63 acre permit. The U.S. Army also encroached on 20.18 acres for which a permit was never acquired. By 1944, acquisition, including the encroachment, was 4,560.06 acres.[7] We have mapped the FUDS boundary in Figures 1, 1a, and 1b (attached hereto as Attachments 7, 8, and 9). As shown and referenced in figures below, the FUDS boundaries have been inconsistently mapped by the Corps. For the purposes of this testimony, we have relied upon the boundary of the map created by the Corps in 2003 because it is more recent than the map included with the 1999 Findings and Determination of Eligibility.

The Blythe Army Airfield was used for heavy bomber pilot and crew training for the Second Air Force heavy bombardment crew from 1943 to 1944. The 85th Bombardment Group and the 390th Bombardment Group were active at Blythe AAF in 1942 and 1943. Up to 75 B-17 bombers were flown and maintained at this site. During this period the military constructed over 650 buildings and other types of improvements including hangars, office buildings, barracks, warehouses, runways and taxiways, water and sewer systems, hospital, fuel and ordnance storage.[8]

A Poorman gunnery range, skeet range, and jeep type target range, all with ammunition storage, were constructed and used by Army personnel.[9] The locations of the ranges are excerpted in Figure 2 below as obtained from the National Archives.[10]

---

[4] Blythe Army Airfield, Findings and Determination of Eligibility, Site Summary Sheet, Project Summary Sheet and Risk Assessment Procedure, DERP-FUDS Site No. J09CA024500, attached hereto as Attachment 2.
[5] *Id.*
[6] *Id.*
[7] *Id.*
[8] *Id.*
[9] *Id.*
[10] Boundary Sketch, Blythe Army Airfield, September 1943.

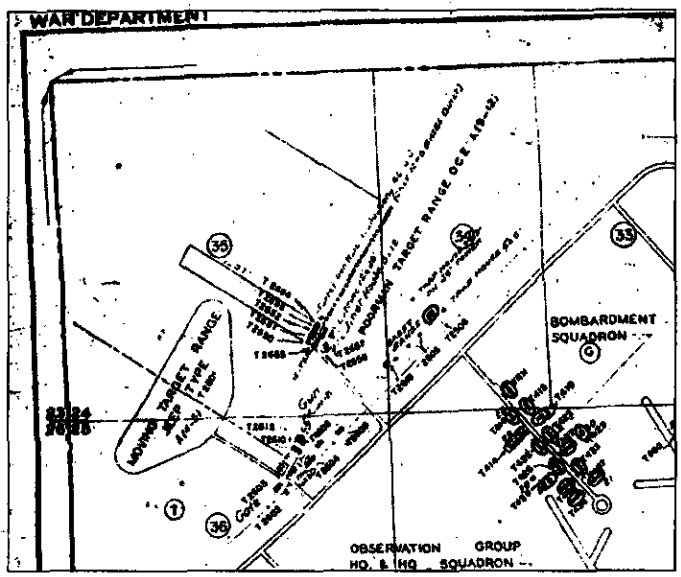


Figure 2: Excerpt from 1943 Boundary Sketch

Safety fans[11] associated with these ranges extend into the Project site, as shown in Attachment 4.[12,13]

The presence of up to five magazines indicates bombs, pyrotechnics and incendiary devices were likely stored at the airfield.[14] What is identified as a "Firing and Bombing Area" in documents provided by the Corps corresponds with the northern portion of the Project footprint (Attachment 7, Figure 1).[15] The Firing and Bombing Area was likely used as a practice bombing range, consistent with mission of Blythe AAF and the types of ordnance that were stored at the base.

---

[11] Safety fans are areas where the bullets would have been directed at distances of up to five miles depending on the caliber and type of projectiles.

[12] Blythe Army Airfield, FUDS Property No. J09CA024500, Installation Map, http://deparc.xservices.com/PDFS/MMRP_MAPS/CA99799F537100.pdf.

[13] Please note that the Corps misidentified the locations of the fans: the location of the Poorman Range and the Jeep Range were switched in the map the Corps prepared (Attachment 4) when compared to the map prepared by the Army (Figure 2 and Attachment 3). We confirmed the transposition of the ranges by identifying the location of the Jeep Range in current aerial photographs in a location consistent with the Army map in Figure 2 and Attachment 3. For purposes of the mapping in Attachment 7, Figure 1, we corrected the locations.

[14] Blythe Army Airfield, Findings and Determination of Eligibility, Site Summary Sheet, Project Summary Sheet and Risk Assessment Procedure, DERP-FUDS Site No. J09CA024500, p. 1, see Attachment 2.

[15] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999 (p. 304 of the ASR).

1. Activities Associated with Poorman Ranges

Poorman ranges were used at bases across the U.S. for training in aerial gunnery. The ranges were developed to simulate conditions encountered by aerial gunners. The gunner learned turret operations and safety procedures while firing at silhouettes of a fighter that moved toward trainees on a track. The turrets generally had twin-mounted .50 caliber machine guns. The range fan associated with the Poorman Range at the Blythe Army Airfield is shown below in Attachment 7, Figure 1 to extend more than 4 miles into the Project right of way.

Figure 3: Poorman Range in Operation[16]

2. Activities Associated with Jeep Ranges

Officially known as "moving target ranges, jeep type," these ranges were used to simulate moving targets for trainees using .30 and .50 caliber machine guns. The Jeeps were guided on tracks behind an earthen bunker with the target extending above the berm. Each gunner's projectiles were tipped with different color paint. Projectiles striking the target left traces of paint which the instructors counted to score the hits of each gunner.[17]

[16] http://www.bomberlegends.com/pdf/BL_Mag_v2-2-GunneryTrain.pdf.
[17] http://www.bomberlegends.com/pdf/BL_Mag_v2-2-GunneryTrain.pdf.

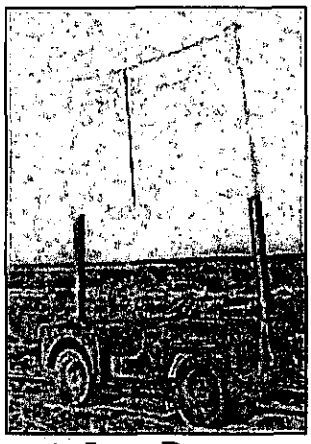


Figure 4: Jeep Range target[18]

The range fan associated with the Jeep Range at the Blythe AAF is shown below in Attachment 7, Figure 1 to extend 3 miles into the Project right of way.

3. Firing and Bombing Range

A map of "Firing and Bombing Area" associated with the Blythe AAF was provided by the Corps and is included with my testimony as Attachment 4. The Firing and Bombing Area is northwest of the Blythe AAF and was annotated on the map as "used during daylight hours, Blythe Air Base." Although records about specific practice bombing activities were not available, typical practice bombing activities at similar ranges included the use of sand or cement filled practice bombs fitted black powder spotting charges or smoke charges, and use of incendiary devices. The use of the spotting, smoke and incendiary devices were to aid in the scoring of the accuracy of the bombardier trainees. This use is confirmed by a 1999 Archive Search Report which found that "large quantities of black powder spotting charges (for practice bombs) and high explosive bombs were stored on the base."[19]

The ASR for the Laguna Maneuver Area identified M38A2 practice bombs as having been utilized at the Blythe AAF.[20] The M38A2 was a one-hundred pound sand-filled bomb fitted with an M1A1 spotting charge. The M1A1 spotting charge contains three pounds of black powder with an inertia-type fuse containing a shotgun primer.[21]

---

[18] http://www.bomberlegends.com/pdf/BL_Mag_v2-2-GunneryTrain.pdf.
[19] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, p. 29.
[20] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, p. 15.
[21] http://www.swf.usace.army.mil/pubdata/fuds/5points/specs/spotting.PDF.

The presence of high explosive bombs at Blythe AAF, as indentified in the ASR, suggests that they were also used for trainees. At other practice bombing ranges, trainees could conclude training with the use of high explosives.[22] Bomb fragments associated with high explosives were found at bombing ranges associated with Blythe AAF in Arizona.[23] Other evidence indicates use of 250 pound general purpose high explosive bombs.[24]

4. Other Activities

In addition to the ranges identified above, the Project area was heavily used during WW II maneuvers associated with the area known as the California Arizona Maneuver Area (CAMA) as evidenced by tanks tracks and numerous holes and depressions in the desert surface. These features are evident in the aerial photographs included with the Phase I ESA but were not identified or evaluated in the Phase I or in other materials that support AFC or the Staff Assessment and Revised Staff Assessment.

Use of practice mines, grenades, mortars, and artillery have been documented in areas used for maneuvers in the CAMA.[25] Recently, a practice land mine was discovered in the course of special status species surveys within the Project study area by a biologist working for the Applicant.[26]

III. POTENTIALLY SIGNIFICANT HAZARDOUS CONDITIONS WITHIN THE PROJECT RIGHT OF WAY

The Applicant identified the Poorman and the Jeep ranges to be within the Project boundary in responses to Staff's data requests.[27] However, the Applicant and Staff failed to identify and analyze the range fans, or safety areas for the Poorman and the Jeep Ranges that would extend almost across the entire Project area.[28]

---

[22] *See e.g.*, http://www.westmesaproject.com/CSM_West_Mesa_2_12Sept08.pdf, p. 2-1

[23] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, p. 35.

[24] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, p. 20.

[25] The Desert Training Center/California Maneuver Area, 1942 – 1944, Volume 2, Historical and Archeological Contexts for the Arizona Desert. p.43, Prepared for the Bureau of Land Management under contract with the U.S. Army Corps of Engineers, Statistical Research Inc., September 2008 (available at http://www.sricrm.com/publications/tech.html).

[26] Email from Shelly Dayman, AECOM, to Tannika Engelhard, U.S. Fish and Wildlife Service, May 26, 2009, attached hereto as Attachment 6.

[27] Applicant's Responses to CEC Data Requests, January 6, 2010, Waste Management, Response to DR-WM-253.

[28] *See* Attachment 7, Figure 1.

The safety fans for the Poorman and the Jeep Ranges that extend beneath the Project right of way may be areas where spent .30 and .50 caliber bullets may be found during project construction. Bullets, when spent upon striking soil, impart metal fragments to the soil matrix. The bullets and impacted soil may contain lead and other metals, including copper, zinc, tungsten, arsenic, antimony, and nickel at concentrations that would pose a risk to workers excavating soil.[29] Lead has been found in association with .50 caliber rounds at a former jeep range at Nellis AFB in California.[30] Sampling for lead and other metals has been conducted at other former jeep ranges.[31] The Staff Assessment, the Revised Staff Assessment, and the Applicant's submittals did not recognize the potential for contamination to be associated with bullets that are likely to be found in the areas of the range fans beneath the Project and no sampling has been conducted to date.

Additionally, the potential for pyrotechnic, incendiary, or tracer ammunition to have been used at the Poorman and Jeep Ranges was not evaluated in the Staff Assessment, the Revised Staff Assessment or the Applicant's submittals. Pyrotechnic and incendiary magazines are identified in the map of Blythe AAF[32] and, therefore, pyrotechnic and incendiary devices were presumably used during training activities associated with the Poorman and Jeep ranges. Additionally, the Corps, in a 1999 assessment of the site, identified "munition (containers) containing White Phosphorus (WP) or other pyrophoric material (i.e.spontaneously flammable)"[33] providing further evidence of the use of pyrotechnics. Incendiaries are also classified as pyrotechnic munitions. Compounds of concern used in pyrotechnic munitions include perchlorates used as oxidizers.[34] Perchlorates are known to inhibit thyroid function[35] and are a risk to human health, primarily through ingestion of drinking water, although inhalation of soil dust is a known route of exposure.[36] Areas where pyrotechnic devices were detonated may present a health risk to construction worker at the Project site.

Worker safety and public heath may be significantly at risk without soil sampling in the areas of the Project underlain by the former Poorman

---

[29] http://www.itrcweb.org/Documents/SMART-2.pdf, p. 3.
[30] http://uxoinfo.com/blogcfc/client/enclosures/Nellis_SmallArmsCom_ASR.pdf, and also attached hereto as Attachment 5.
[31] See for example, http://www.azdeq.gov/environ/waste/sps/download/state/031010fs1.pdf, http://www.propfirst.com/BellaVista/PinecastleRange.pdf, and http://www.itrcweb.org/Documents/SMART-2.pdf.
[32] Boundary Sketch, Blythe Army Airfield, September 1943
[33] Blythe Army Airfield, Findings and Determination of Eligibility, Site Summary Sheet, Project Summary Sheet and Risk Assessment Procedure, DERP-FUDS Site No. J09CA024500, see Attachment 2.
[34] http://www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/HWMP_WS_dPerch-Sec9.pdf.
[35] http://www.itrcweb.org/Documents/PERC-1.pdf.
[36] http://oehha.ca.gov/risk/pdf/120409Perchlorate.pdf.

and Jeep Ranges. Soil sampling should be undertaken to include the metals associated with the projectiles used in the firing ranges and to include components of the pyrotechnics, including perchlorates. The Applicant and Staff also failed to identify and analyze the former Firing and Bombing Area, corresponding to the northern portion of the Project footprint. This feature likely represents a former practice bombing range. A figure, depicting the Firing and Bombing Area was provided in1999 document prepared by the Corps.[37] UXO may be present in the Firing and Bombing Area in the form of practice bombs and incendiary devices. In addition to the explosion hazard represented by the UXO, chemicals may be found in soil to be associated with the practice bombs and incendiary devices.

UXO and the chemicals associated with practice bombing ranges across the country have been the subject of numerous Corps-led investigations to ensure public safety.[38] Worker safety and public heath may be significantly at risk without conducting a thorough Corps-led UXO survey under regulatory oversight. A soil sampling program is also necessary to protect health if UXO are found.

Finally, the Applicant and Staff failed to indentify and analyze WW II era activities associated with the California-Arizona Maneuver Area (CAMA), evidence of which also appear in the maps attached to the Applicant's Phase I ESA. CAMA activities are known to have included training and use of live ammunition.[39] Following military use in WW II, munitions have been recovered in the areas of training, including high explosive shells, hand grenades, antitank mines, fuses, rocket shells, flares and shrapnel.[40] The shells, grenades, mines and other UXO represent a significant hazard to workers.

IV. CONDITIONS OF CERTIFICATION WASTE-1 AND WASTE-2 ARE INADEQUATE

The Army Corps of Engineers, acting on behalf of the Secretary of Defense, maintains oversight responsibility for formerly used defense sites

---

[37] U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, Appendix L-2, California-Arizona Maneuver Area Firing and Bombing Area Map, Circa 1943 (B-56).

[38] See for example, http://www.sac.usace.army.mil/?action=programs.formerly_used_defense_sites_projects, and http://www.trabuco-bombrange.com/welcome.php.

[39] The Desert Training Center/California Maneuver Area, 1942 – 1944, Volume 2, Historical and Archeological Contexts for the Arizona Desert. p.43, Prepared for the Bureau of Land Management under contract with the U.S. Army Corps of Engineers, Statistical Research Inc., September 2008 (available at http://www.sricrm.com/publications/tech.html).

[40] Id., p. 60.

(FUDS) under the Defense Environmental Restoration Program (DERP) Act. DERP assigns DoD the responsibility to conduct response actions at FUDS subject to and consistent with CERCLA and the National Contingency Plan.[3]

For FUDS that are not listed on the CERCLA National Priorities List, the U.S EPA defers regulatory oversight to the states. In California, the Corps' assessment and cleanup of FUDS is overseen by the Department of Toxic Substances Control (DTSC). FUDS containing unexploded ordnance are subject to the regulatory investigation and cleanup standards of the National Contingency Plan, which requires the following regulatory response process:

1. Inventory: The Corps verifies that a property is eligible as a FUDS and evaluates the potential issues or concerns at the site. The findings of this phase are presented in an Inventory Project Report, or INPR, also referred to as a remedial Preliminary Assessment.

2. Preliminary Assessment (PA): The PA phase consists of collecting readily available property information and conducting a property visit. The PA identifies potential projects within the FUDS and whether the projects qualify for cleanup under the DERP. In addition, the PA results are used to assess the need for cleanup and to estimate the severity of the issue.

3. Military Munitions Response Program Site Investigation (SI): The SI phase involves visiting the property to confirm the data that was collected during the PA. Additional site-specific data is collected, and limited environmental investigations are performed to confirm the presence of military munitions.

4. Remedial Investigation (RI)/Feasibility Study (FS): This phase includes conducting an RI to characterize the nature and threat posed by the military munitions identified during the SI and gathering data necessary to assess the extent to which these pose a threat to human health, safety, or the environment. Then, an FS is conducted to ensure that appropriate remedial alternatives are developed and evaluated, and an appropriate remedy is selected.

5. Response: This phase consists of developing the engineering design and doing what is necessary to remove military munitions.

6. Public Review and Comment: Response plans, along with supporting analyses, are made available for public comment and review. Following this review, a remedy is selected.

The Corps has undertaken numerous responses at firing ranges and practice bombing ranges across the county that follow the above process.[41]

The Applicant and the Staff Assessment fail to recognize ongoing state and federal response actions at the Project site. The Corps first designated the Blythe Army Airfield (AAF) a formerly used defense site (FUDS) subject to DERP in 1987.[42] The DERP-FUDS INPR that the Corps completed for this project in 1987 recommended an environmental restoration project to address 13 aviation fuel underground storage tanks and building concerns on the site. According to the Corps' documents, the tanks were removed and that DERP project was completed in 1987. The Corps completed a supplemental Project Summary Sheet for the site in 1999 following a site visit by Mr. Kyle Cook a consultant to the Corps, which identified the potential presence of bombs, explosive materials and incendiary and pyrotechnic materials on the site. Mr. Cook prepared a risk assessment of the site in accordance with the Corps' guidelines and recommended that the Corps initiate a PA of these potential contaminants.

Pursuant to the Corp's guidelines, Risk Assessment Code (RAC) scores are assigned on a scale from 1 to 5, with 1 being the highest risk. The RAC score of a site consists of two factors: risk severity and risk probability. Risk severity RAC scores are determined primarily by the types of munitions known or suspected to have been used at the installation. The RAC calculated potential hazards associated with the "gunnery range and explosives magazines on-site, and the possible presence of incendiary and pyrotechnic magazines"[43] On the basis of the evaluation, a RAC of 3 was calculated. Mr. Cook described the "hazard severity" of the site as "catastrophic." Because the site was deemed remote and risk probability low, Mr. Cook recommended a RAC score of 4. Mr. Cook determined that the total hazard severity value of the site was 28. This investigation and cleanup project was found eligible for evaluation under the DERP on September 30, 1999. However, no documentation was available from the Corps of Engineers to indicate that further action had been taken. Further evaluation of Blythe AAF is indicated by the date of the maps that were created by the Corps of the FUDS boundary and the Poorman and the Jeep Ranges included as Attachment 4: the date of these maps is February 28, 2003 and March 10, 2003, respectively.[44] The Project site is also under active oversight by DTSC.

---

[41] See for example, http://www.westmesaproject.com/West_Mesa_Fact_Sheet_2.pdf, and http://www.saj.usace.army.mil/Divisions/ProgramProjectMgt/Branches/Interg_IntSvcs/FUDS/DOCS/Pinecastle/Presentations/2008-02-26RABPresent.pdf .

[42] See Attachment 2.

[43] See Attachment 2 at p. 18/18.

[44] Blythe Army Airfield, FUDS Property No. J09CA024500, Installation Map, http://deparc.xservices.com/PDFS/MMRP_MAPS/CA99799F537100.pdf.

The DTSC website lists the cleanup status of Blythe AAF as "Inactive, needs evaluation as of 7/12/2005."[45]

Staff proposes WASTE-1 and WATE -2 as mitigation for worker exposure to unexploded ordnance and potential soil contamination. This condition is inadequate because it does not comply with the procedures of the National Contingency Plan and the DERP. The AFC and the Staff Assessment fail to recognize: (1) the regulatory context of the former military site and associated UXO, including the roles and responsibilities of federal and state agencies; (2) the extent and type of the military use of the project site; and (3) the potential safety issues represented by the UXO to construction workers involved in the excavation of 8.3 million cubic yards of soil[46] over a nine square mile area,[47] large portions of which are known to have been used for weapons training and practice bombing.

Condition of Certification WASTE-1 provides only for a plan to train construction workers and other site workers in the recognition of potential UXO. Condition of Certification WASTE-2 requires that a Professional Engineer or Professional Geologist to be available during site characterization (if needed), excavation, grading, and demolition activities. The Professional Engineer or Professional Geologist will be given authority by the project owner to oversee any earth-moving activities that have the potential to disturb contaminated soil and impact public health, safety, and the environment. Without additional conditions of certification, however, the site represents significant safety issues to the construction workers.

Presumably, Staff drafted WASTE-1 and WASTE-2 without knowledge of the safety fans associated with jeep range and Poorman ranges, or evidence and parameters of the Firing and Bombing Area on the Project site. Typically, where such hazards are known, extensive geophysical surveys would be conducted under regulatory oversight well in advance of earthmoving activities. Such surveys require that a project site be systemically traversed by vehicles using GPS to document the areas that have been assessed.[48] The location of debris is marked and the debris evaluated and removed if determined to be inert. Any potentially live ordnance would be marked for proper evaluation and detonation. Such evaluations must be completed prior to the start of any construction to avoid potentially significant risk to worker safety. Staff must specifically require in the condition of certification that the Applicant undertake the appropriate

---

[45] http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=80000199.
[46] Revised Staff Assessment, p. C.9-40.
[47] Revised Staff Assessment, p. C.12-15.
[48] See for example, http://www.corpsfuds.org/reports/Map/J09NV1112map_debrisRemoval2.pdf.

surveys, testing, removal, and closure actions on the entirety of the Project disturbance area before construction can begin. In my opinion, given the extensive military use as a Poorman Range, a Jeep Range and a practice bombing range, it is not possible to begin earth moving activities without compromising worker safety until the entire Project disturbance area has been surveyed for UXO and the soil has been sampled for chemical constituents.

Given that a portion of the BSPP is underlain by a FUDS, the Blythe AAF, the Corps of Engineers has the responsibility to conduct geophysical surveys and to identify any UXO associated with the firing ranges and the practice bombing range. A condition of certification should be required to include a thorough geophysical survey, conducted by the Corps under the oversight of DTSC, to identify any UXO that may present a hazard to construction and site personnel. The failure to recognize the role of the oversight agencies, the extent and significance of military operations, and the potential threat to worker safety without a thorough UXO evaluation under agency oversight represent significant shortcomings in the Staff Assessment. Staff must require the applicant to engage the Corps of Engineers to undertake an evaluation under DTSC oversight to ensure that federal and state requirements for assessing UXO on a former military site will be met before construction can begin.

DECLARATION

I, Matt Hagemann, declare as follows:

I have reviewed the above testimony regarding the Blythe Solar Power Project. To the best of my knowledge, all of the facts in my testimony are true and correct. To the extent that this testimony contains opinion, such opinion is my own.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct to the best of my knowledge and belief. This declaration is signed at Newport Beach, California.

Dated: 6/10/2010

Signed: M Hagemann

PROFESSIONAL GEOLOGIST
MATTHEW HAGEMANN
No.8571
STATE OF CALIFORNIA

EXHIBIT 334

ATTACHMENT 1

SWAPE Technical Consultation, Data Analysis and Litigation Support for the Environment

2503 Eastbluff Dr.
Suite 206
Newport Beach, California92660
Tel: (949) 887-9013
Fax: (949) 717-0069
Email: mhagemann@swape.com

Matthew F. Hagemann, P.G.

Geologic and Hydrogeologic Characterization
Investigation and Remediation Strategies
Regulatory Compliance
CEQA Review
Expert Witness

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.
B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

Professional Certification:

California Professional Geologist, License Number 8571.

Professional Experience:

Matt has 25 years of experience in environmental policy, assessment and remediation. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) while also working with permit holders to improve hydrogeologic characterization and water quality monitoring.

Matt has worked closely with U.S. EPA legal counsel and the technical staff of several states in the application and enforcement of RCRA, Safe Drinking Water Act and Clean Water Act regulations. Matt has trained the technical staff in the States of California, Hawaii, Nevada, Arizona and the Territory of Guam in the conduct of investigations, groundwater fundamentals, and sampling techniques.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Senior Environmental Analyst, Komex H2O Science, Inc (2000 -- 2003);
- Executive Director, Orange Coast Watch (2001 – 2004);
- Senior Science Policy Advisor and Hydrogeologist, U.S. Environmental Protection Agency (1989–1998);
- Hydrogeologist, National Park Service, Water Resources Division (1998 – 2000);

- Adjunct Faculty Member, San Francisco State University, Department of Geosciences (1993 – 1998);
- Instructor, College of Marin, Department of Science (1990 – 1995);
- Geologist, U.S. Forest Service (1986 – 1998); and
- Geologist, Dames & Moore (1984 – 1986).

Senior Regulatory and Litigation Support Analyst:

With SWAPE, Matt's responsibilities have included:

- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a project to provide technical assistance to a comunity adjacent to a former Naval shipyard under a grant from the U.S. EPA.
- Lead analyst in the review of numerous environmental impact reports under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, greenhouse gas emissions and geologic hazards.
- Lead analyst in the review of environmental issues in applications before the California Energy Commission.
- Technical assistance and litigation support for vapor intrusion concerns.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.
- Expert witness on two cases involving MTBE litigation.
- Expert witness and litigation support on the impact of air toxins and hazards at a school.
- Expert witness in litigation at a former plywood plant.

With Komex H2O Science Inc., Matt's duties included the following:

- Senior author of a report on the extent of perchlorate contamination that was used in testimony by the former U.S. EPA Administrator and General Counsel.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of MTBE use, research, and regulation.
- Senior researcher in the development of a comprehensive, electronically interactive chronology of perchlorate use, research, and regulation.
- Senior researcher in a study that estimates nationwide costs for MTBE remediation and drinking water treatment, results of which were published in newspapers nationwide and in testimony against provisions of an energy bill that would limit liability for oil companies.
- Research to support litigation to restore drinking water supplies that have been contaminated by MTBE in California and New York.
- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.
- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

As Executive Director with Orange Coast Watch, Matt led efforts to restore water quality at Orange County beaches from multiple sources of contamination including urban runoff and the discharge of

wastewater. In reporting to a Board of Directors that included representatives from leading Orange County universities and businesses, Matt prepared issue papers in the areas of treatment and disinfection of wastewater and control of the dischrge of grease to sewer systems. Matt actively participated in the development of countywide water quality permits for the control of urban runoff and permits for the discharge of wastewater. Matt worked with other nonprofits to protect and restore water quality, including Surfrider, Natural Resources Defense Council and Orange County CoastKeeper as well as with business institutions including the Orange County Business Council.

Hydrogeology:

As a Senior Hydrogeologist with the U.S. Environmental Protection Agency, Matt led investigations to characterize and cleanup closing military bases, including Mare Island Naval Shipyard, Hunters Point Naval Shipyard, Treasure Island Naval Station, Alameda Naval Station, Moffett Field, Mather Army Airfield, and Sacramento Army Depot. Specific activities were as follows:

- Led efforts to model groundwater flow and contaminant transport, ensured adequacy of monitoring networks, and assessed cleanup alternatives for contaminated sediment, soil, and groundwater.
- Initiated a regional program for evaluation of groundwater sampling practices and laboratory analysis at military bases.
- Identified emerging issues, wrote technical guidance, and assisted in policy and regulation development through work on four national U.S. EPA workgroups, including the Superfund Groundwater Technical Forum and the Federal Facilities Forum.

At the request of the State of Hawaii, Matt developed a methodology to determine the vulnerability of groundwater to contamination on the islands of Maui and Oahu. He used analytical models and a GIS to show zones of vulnerability, and the results were adopted and published by the State of Hawaii and County of Maui.

As a hydrogeologist with the EPA Groundwater Protection Section, Matt worked with provisions of the Safe Drinking Water Act and NEPA to prevent drinking water contamination. Specific activities included the following:

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted public hearings, and responded to public comments from residents who were very concerned about the impact of designation.
- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

Matt served as a hydrogeologist with the RCRA Hazardous Waste program. Duties were as follows:

- Supervised the hydrogeologic investigation of hazardous waste sites to determine compliance with Subtitle C requirements.
- Reviewed and wrote "part B" permits for the disposal of hazardous waste.

- Conducted RCRA Corrective Action investigations of waste sites and led inspections that formed the basis for significant enforcement actions that were developed in close coordination with U.S. EPA legal counsel.
- Wrote contract specifications and supervised contractor's investigations of waste sites.

With the National Park Service, Matt directed service-wide investigations of contaminant sources to prevent degradation of water quality, including the following tasks:

- Applied pertinent laws and regulations including CERCLA, RCRA, NEPA, NRDA, and the Clean Water Act to control military, mining, and landfill contaminants.
- Conducted watershed-scale investigations of contaminants at parks, including Yellowstone and Olympic National Park.
- Identified high-levels of perchlorate in soil adjacent to a national park in New Mexico and advised park superintendent on appropriate response actions under CERCLA.
- Served as a Park Service representative on the Interagency Perchlorate Steering Committee, a national workgroup.
- Developed a program to conduct environmental compliance audits of all National Parks while serving on a national workgroup.
- Co-authored two papers on the potential for water contamination from the operation of personal watercraft and snowmobiles, these papers serving as the basis for the development of nation-wide policy on the use of these vehicles in National Parks.
- Contributed to the Federal Multi-Agency Source Water Agreement under the Clean Water Action Plan.

Policy:

Served senior management as the Senior Science Policy Advisor with the U.S. Environmental Protection Agency, Region 9. Activities included the following:

- Advised the Regional Administrator and senior management on emerging issues such as the potential for the gasoline additive MTBE and ammonium perchlorate to contaminate drinking water supplies.
- Shaped EPA's national response to these threats by serving on workgroups and by contributing to guidance, including the Office of Research and Development publication, Oxygenates in Water: Critical Information and Research Needs.
- Improved the technical training of EPA's scientific and engineering staff.
- Earned an EPA Bronze Medal for representing the region's 300 scientists and engineers in negotiations with the Administrator and senior management to better integrate scientific principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

Geology:

With the U.S. Forest Service, Matt led investigations to determine hillslope stability of areas proposed for timber harvest in the central Oregon Coast Range. Specific activities were as follows:

- Mapped geology in the field, and used aerial photographic interpretation and mathematical models to determine slope stability.
- Coordinated his research with community members who were concerned with natural resource protection.
- Characterized the geology of an aquifer that serves as the sole source of drinking water for the city of Medford, Oregon.

As a consultant with Dames and Moore, Matt led geologic investigations of two contaminated sites (later listed on the Superfund NPL) in the Portland, Oregon, area and a large hazardous waste site in eastern Oregon. Duties included the following:

- Supervised year-long effort for soil and groundwater sampling.
- Conducted aquifer tests.
- Investigated active faults beneath sites proposed for hazardous waste disposal.

Teaching:

From 1990 to 1998, Matt taught at least one course per semester at the community college and university levels:

- At San Francisco State University, held an adjunct faculty position and taught courses in environmental geology, oceanography (lab and lecture), hydrogeology, and groundwater contamination.
- Served as a committee member for graduate and undergraduate students.
- Taught courses in environmental geology and oceanography at the College of Marin.

Invited Testimony, Reports, Papers and Presentations:

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Presentation to the Public Environmental Law Conference, Eugene, Oregon.

Hagemann, M.F., 2008. Disclosure of Hazardous Waste Issues under CEQA. Invited presentation to U.S. EPA Region 9, San Francisco, California.

Hagemann, M.F., 2005. Use of Electronic Databases in Environmental Regulation, Policy Making and Public Participation. Brownfields 2005, Denver, Coloradao.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Nevada and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Las Vegas, NV (served on conference organizing committee).

Hagemann, M.F., 2004. Invited testimony to a California Senate committee hearing on air toxins at schools in Southern California, Los Angeles.

Brown, A., Farrow, J., Gray, A. and **Hagemann, M.**, 2004. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to the Ground Water and Environmental Law Conference, National Groundwater Association.

Hagemann, M.F., 2004. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in Arizona and the Southwestern U.S. Presentation to a meeting of the American Groundwater Trust, Phoenix, AZ (served on conference organizing committee).

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River and Impacts to Drinking Water in the Southwestern U.S. Invited presentation to a special committee meeting of the National Academy of Sciences, Irvine, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a tribal EPA meeting, Pechanga, CA.

Hagemann, M.F., 2003. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal repesentatives, Parker, AZ.

Hagemann, M.F., 2003. Impact of Perchlorate on the Colorado River and Associated Drinking Water Supplies. Invited presentation to the Inter-Tribal Meeting, Torres Martinez Tribe.

Hagemann, M.F., 2003. The Emergence of Perchlorate as a Widespread Drinking Water Contaminant. Invited presentation to the U.S. EPA Region 9.

Hagemann, M.F., 2003. A Deductive Approach to the Assessment of Perchlorate Contamination. Invited presentation to the California Assembly Natural Resources Committee.

Hagemann, M.F., 2003. Perchlorate: A Cold War Legacy in Drinking Water. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. From Tank to Tap: A Chronology of MTBE in Groundwater. Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. A Chronology of MTBE in Groundwater and an Estimate of Costs to Address Impacts to Groundwater. Presentation to the annual meeting of the Society of Environmental Journalists.

Hagemann, M.F., 2002. An Estimate of the Cost to Address MTBE Contamination in Groundwater (and Who Will Pay). Presentation to a meeting of the National Groundwater Association.

Hagemann, M.F., 2002. An Estimate of Costs to Address MTBE Releases from Underground Storage Tanks and the Resulting Impact to Drinking Water Wells. Presentation to a meeting of the U.S. EPA and State Underground Storage Tank Program managers.

Hagemann, M.F., 2001. From Tank to Tap: A Chronology of MTBE in Groundwater. Unpublished report.

Hagemann, M.F., 2001. Estimated Cleanup Cost for MTBE in Groundwater Used as Drinking Water. Unpublished report.

Hagemann, M.F., 2001. Estimated Costs to Address MTBE Releases from Leaking Underground Storage Tanks. Unpublished report.

Hagemann, M.F., and VanMouwerik, M., 1999. Potential Water Quality Concerns Related to Snowmobile Usage. Water Resources Division, National Park Service, Technical Report.

VanMouwerik, M. and **Hagemann, M.F.** 1999, Water Quality Concerns Related to Personal Watercraft Usage. Water Resources Division, National Park Service, Technical Report.

Hagemann, M.F., 1999, Is Dilution the Solution to Pollution in National Parks? *The George Wright Society* Biannual Meeting, Asheville, North Carolina.

Hagemann, M.F., 1997, The Potential for MTBE to Contaminate Groundwater. U.S. EPA Superfund Groundwater Technical Forum Annual Meeting, Las Vegas, Nevada.

Hagemann, M.F., and Gill, M., 1996, Impediments to Intrinsic Remediation, Moffett Field Naval Air Station, Conference on Intrinsic Remediation of Chlorinated Hydrocarbons, Salt Lake City.

Hagemann, M.F., Fukunaga, G.L., 1996, The Vulnerability of Groundwater to Anthropogenic Contaminants on the Island of Maui, Hawaii. Hawaii Water Works Association Annual Meeting, Maui, October 1996.

Hagemann, M. F., Fukanaga, G. L., 1996, Ranking Groundwater Vulnerability in Central Oahu, Hawaii. Proceedings, Geographic Information Systems in Environmental Resources Management, Air and Waste Management Association Publication VIP-61.

Hagemann, M.F., 1994. Groundwater Characterization and Cleanup at Closing Military Bases in California. Proceedings, California Groundwater Resources Association Meeting.

Hagemann, M.F. and Sabol, M.A., 1993. Role of the U.S. EPA in the High Plains States Groundwater Recharge Demonstration Program. Proceedings, Sixth Biennial Symposium on the Artificial Recharge of Groundwater.

Hagemann, M.F., 1993. U.S. EPA Policy on the Technical Impracticability of the Cleanup of DNAPL-contaminated Groundwater. California Groundwater Resources Association Meeting.

Hagemann, M.F., 1992. Dense Nonaqueous Phase Liquid Contamination of Groundwater: An Ounce of Prevention... Proceedings, Association of Engineering Geologists Annual Meeting, v. 35.

EXHIBIT 335

Declaration

I, Janet M. Laurain, declare as follows:

1. I am a paralegal at Adams Broadwell Joseph & Cardozo. I make this declaration from my personal knowledge. If called as a witness, I could testify competently to facts stated in this declaration.

2. On March 29, 2010, I submitted a Freedom of Information Act Request to the U.S. Army Corps of Engineers regarding the following three formerly used defense sites (FUDS):

(1) Blythe Army Airfield;

(2) Blythe Army Airfield BEA Site #1; and

(3) Blythe Army Airfield Bea Site #2.

Our request sought the following specific categories of documents for each of the above FUDS:

(1) copies of any and all Inventory Project Reports;

(2) copies of any and all Preliminary Assessments;

(3) copies of any comments or records of consultation between ACE and the U.S. Environmental Protection Agency with regard to response actions at the FUDS;

(4) copies of any and all "No Defense Department Action Indicated" decision documents; and

(5) historical records or drawings indicating storage or usage of bombs and explosive materials, and incendiary and pyrotechnic materials within the FUDS area.

3. On May 20, 2010, I received a response to my March 29, 2010 request. Attached as Exhibit 336 is a true and correct copy of the U.S. Army Corps of Engineers' response to CURE's FOIA request.

4. The following documents were attached with the May 20, 2010 response:

A. Defense Environmental Restoration Program Formerly Used Defense Sites Findings and Determination of Eligibility Site No. J09CA024500 (18 pages), included as Exhibit 337.

5. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this 15th day of June, 2010, at South San Francisco, California.

Janet M. Laurain

Janet M. Laurain

EXHIBIT 336

2398 FOIA response: UP E. (3/29/10)

Janet M. Laurain

From: Ayala, Anna M SPL Contractor [Anna.M.Ayala@usace.army.mil]
Sent: Thursday, May 20, 2010 1:39 PM
To: Janet M. Laurain
Subject: RE: FOIA request: Blythe Army Airfield
Attachments: J09CA024500_01.08_0500_a.pdf; J09CA024300_01.08_0003_a.pdf; J09CA024300_01.08_0004_a.pdf; J09CA024400_01.08_0003_a.pdf; J09CA024400_01.08_0004_a.pdf

Hello Janet,

As per your FOIA request - Blythe Army Airfield (FUDS) dated March 29, 2010:

Attached you will find Inventory Project Reports for each of the requested sites:

Blythe Army Airfield J09CA024500
Blythe Army Airfield Beacon #1 J09CA024300 Blythe Army Airfield Beacon Site #2 J09CA024400

Regards,

Anna Ayala
USACE, Los Angeles District
Programs & Project Management Division

EXHIBIT 337

ATTACHMENT 2

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FORMERLY USED DEFENSE SITES
FINDINGS AND DETERMINATION OF ELIGIBILITY

BLYTHE ARMY AIRFIELD
BLYTHE, CALIFORNIA
SITE NO. J09CA024500

FINDINGS OF FACT

1. Between 1942 and 1944, the Army acquired 4,248.12 acres in fee from various private parties, 6.54 acres of public domain land via transfer, a 282.61 acre leasehold from the County of Riverside, a 1.98 acre easement and 0.63 acre permit. Additionally, the Army encroached on another 20.18 acres for which a real estate agreement was never signed. Total acquisition, including the encroachment, was 4,560.06 acres.

2. The Army Air Corps established the Blythe Army Airfield which was used for heavy bomber pilot and crew training during 1943 and 1944. Numerous military improvements were constructed at this airfield including hangars, office buildings, barracks, warehouses, runways and taxiways, water and sewer systems, hospital, and fuel and ordnance storage. A poorman gunnery range, skeet range, and jeep type target range, all with ammunition storage, were constructed and used by Army personnel. Bombs, pyrotechnics and incendiary devices may have also been stored in magazines at the airfield.

3. The entire airfield was declared surplus to the needs of the Army in 1946 and was reported to the General Services Administration (GSA) for disposal. On 10 September 1948 the U.S. Government conveyed title and interest in the entire 4,560.06 acre site, including the leasehold and encroachment, to the County of Riverside via quitclaim deed. The County of Riverside has leased the airport to the City of Blythe which operates it as municipal airport facility. Only a few military improvements remain including five buildings and portions of the runways and parking apron.

SITE No. J09CA024500
Original: 18 February 1987
Supplemental: 26 August 1999

DETERMINATION

Based on the foregoing Findings of Fact, this site has been determined to be formerly used by the Department of Defense. It is therefore eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites, established under 10 USC 2701 et seq.

30 Sep 99
DATE

Thom T. Hodgins COL
for PETER T. MADSEN
Colonel (P), U.S. Army
Commanding

SITE SURVEY SUMMARY SHEET
FOR
DERP-FUDS SITE NO. J09CA024500
BLYTHE ARMY AIRFIELD
Original: 18 February 1987
Supplemental 26 August 1999

SITE NAME: BLYTHE ARMY AIRFIELD, Blythe Army Airbase.

LOCATION: Riverside County, California. This site is approximately 6 miles due west of the City of Blythe on West Hobsonway, adjacent to Interstate 10.

SITE HISTORY: The Army entered into a lease on 1 June 1942 with the County of Riverside to acquire use of 290.45 acres (later determined to be 282.61 acres) consisting of the Blythe Airport. Between 1942 and 1944 a total of 2354.89 acres of public domain land were transferred to the War Dept. and all desert claims cleared through declaration of taking. A total 1,896.04 acres were acquired in fee from various private parties. A total of 6.54 acres of public domain land were acquired for right-of-ways as well as a 1.98 acre easement and 0.63 acre permit. The Army encroached on 20.18 acres for which a permit was never acquired. Total acquisition, including the encroachment, was 4,560.06 acres. The Army established Blythe Army Airfield (BAA) which was a 2nd Air Force heavy bombardment crew training base during WWII. The 85th Bombardment Group and the 390th Bombardment Group were active at BAA in 1942 and 1943. Up to 75 B-17 bombers were flown and maintained at this site. During this period the military constructed over 650 buildings and other types of improvements including hangars, office buildings, barracks, warehouses, runways and taxiways, water and sewer systems, hospital, fuel and ordnance storage.

The DERP-FUDS Inventory Project Report (INPR) completed for this site in 1989 recommended an environmental restoration project to address 13 aviation fuel underground storage tanks and building safety concerns, all DOD improvements. This project has begun and may be near completion.

Historical records and drawings indicate that bombs and explosive materials, and possibly incendiary and pyrotechnic materials, were stored on-site in up to five magazines or bunkers. A poorman gunnery range, skeet range, and jeep type target range, all with ammunition storage, were constructed and used by Army personnel. The 1989 INPR made no mention of the presence or use of ordnance or explosive materials at BAA, and

no OE investigation was recommended. Documentation indicates the site was decontaminated.

This site is currently owned by Riverside County and leased to the City of Blythe. The main runways and a few remaining buildings constructed by DOD are beneficially used by the city as an airport. Ail other improvements constructed by DOD have been demolished.

SITE VISIT: The site was visited on 2 June 1999 by Mr. Kyle Cook of Science Applications International Corporation, San Diego, CA.

CATEGORY OF HAZARD: CON/HTRW, **OE.**

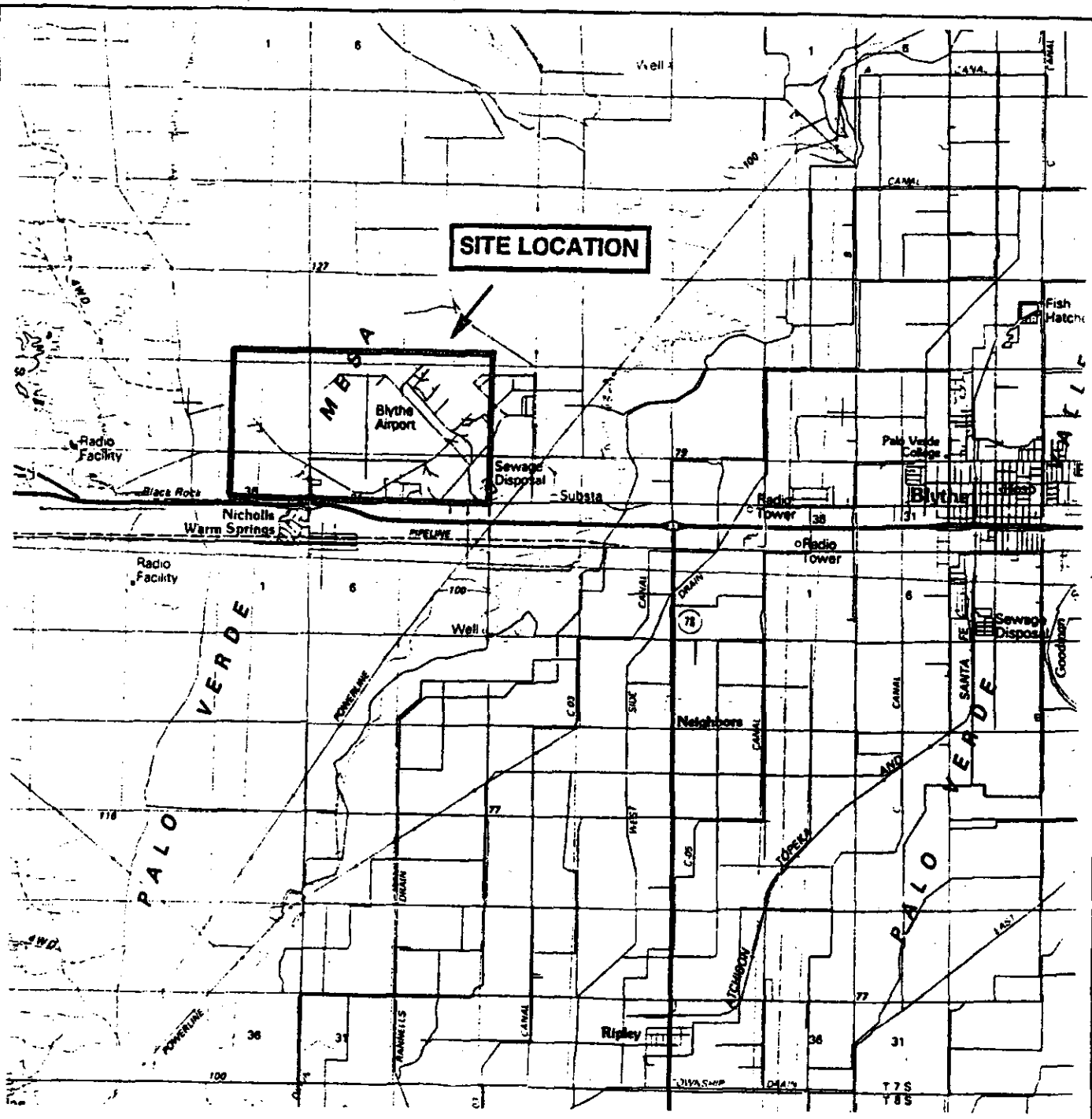
PROJECT DESCRIPTION: There are two potential projects.

a. CON/HTRW: Eleven (11) 25,000 gallon and two (2) 12,000 gallon USTS were installed by the Army during WWII, were not beneficially used, and are eligible for removal. A project has already been approved and completed.

b. OE: Recommend Huntsville Engineering and Support Center make a determination regarding further investigation at this site.

AVAILABLE STUDIES AND REPORTS: Information about the historical use and storage of ordnance and explosive materials at BAA was recently published in the Archives Search Report Findings for the Former Laguna Maneuver Area, September 1998.

DISTRICT POC: Jeffery B. Armentrout, Los Angeles District, (213) 452-3720.



QUADRANGLE LOCATION

N

Scale

0 4 miles

Reference: USGS Topographic Blythe, Calif.-Arizona 1:100,000, 1986. R21E and T6S.

Science Applications International Corporation
An Employee-Owned Company

SITE LOCATION MAP
Supplemental 26 August 1999
BLYTHE ARMY AIR FIELD
J09CA024500
Blythe, CA

PROJECT NO.		
01-0255-04-1541		
DRAWN BY	CHECKED BY	DATE
EB	KC	08-99

PROJECT SUMMARY SHEET
FOR
DERP-FUDS CON/HTRW PROJECT NO. J09CA024501
BLYTHE ARMY AIRFIELD
SITE NO. J09CA024500
Original: 18 February 1987
Supplemental 26 August 1999

PROJECT DESCRIPTION: The project consists of the removal of thirteen underground storage tanks (USTs) and demolition of one building. The tanks were installed during WWII. There were eleven (11) tanks containing aviation fuel with 25,000 gallon capacities. The remaining two tanks had a capacity of 12,000 gallons and contained fuel oil.

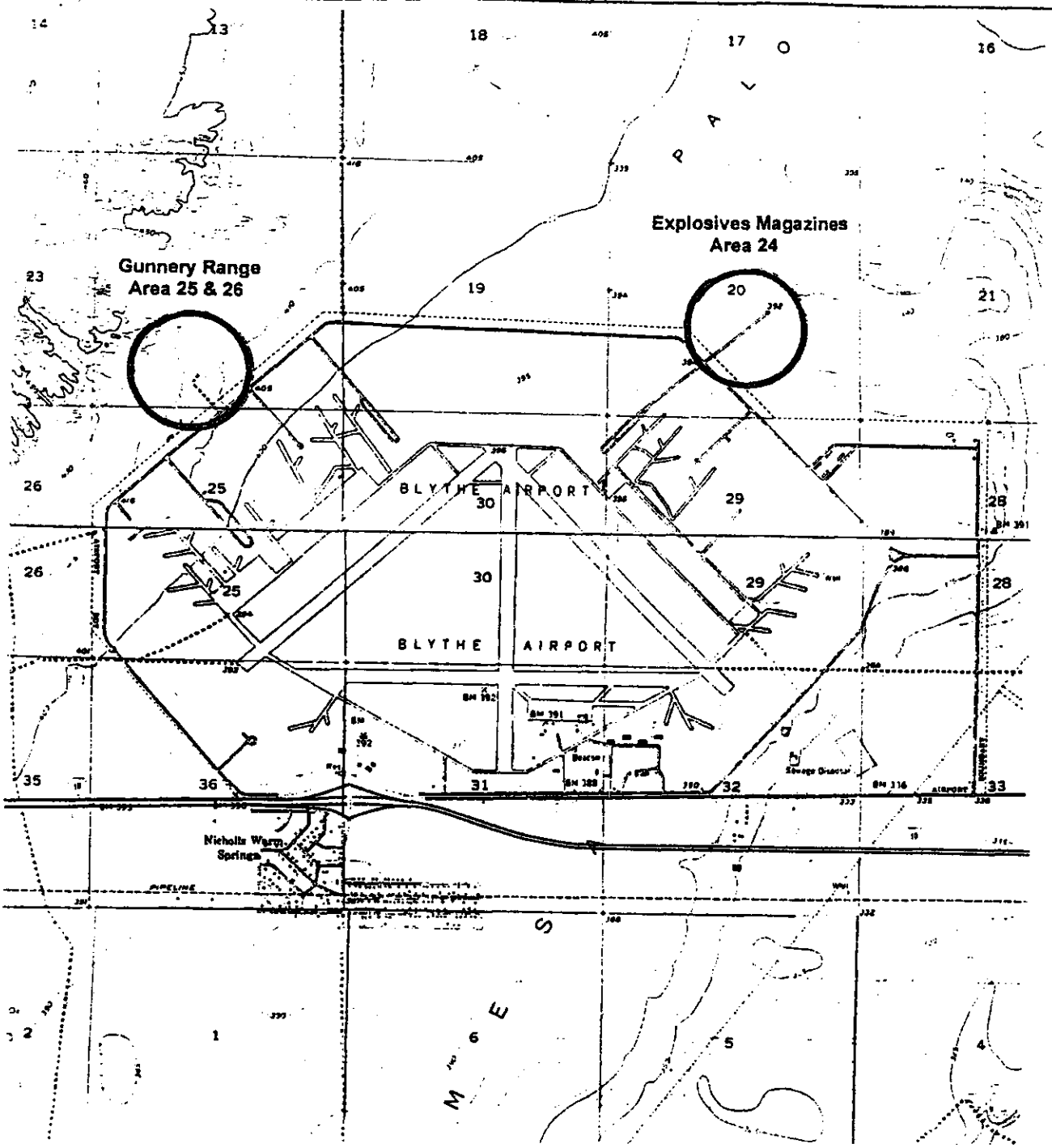
PROJECT ELIGIBILITY: The DOD controlled this property from approximately 1942 until 1946. No beneficial use of these thirteen tanks is known to have occurred by the County of Riverside or any other entity.

POLICY CONSIDERATIONS: The quitclaim deed transferring title to the County of Riverside contains a provision releasing the U.S. Government from all liability for restoration or damage. However, this does not preclude the County from seeking reimbursement for the necessary rehabilitation or repair of pubic airports covered under Section 17 of the Federal Airport Act.

PROPOSED PROJECT: The project has been completed with the removal of all thirteen tanks.

DD 1391: Attached.

DISTRICT POC: Mr. Jeffery B. Armentrout, (213) 452-3720.



Reference: USGS Quadrangle McCoy Wash, Calif., Scale 1:24,000; Photorevised 1970 and USGS Quadrangle Ripley, Calif., Scale 1:24,000; Photorevised 1975. R21E and T6S.

N

Scale

0 1 mile

SAIC®
Science Applications International Corporation
An Employee-Owned Company

CON/HTRW PROJECT MAP
Supplemental 23 June 1999
BLYTHE ARMY AIRFIELD
J09CA024501
Blythe, CA

PROJECT NO.		
01-0255-04-1541		
DRAWN BY	CHECKED BY	DATE
EB	KC	08-99

PROJECT SUMMARY SHEET
FOR
DERP-FUDS OE PROJECT NO. J09CA024502
BLYTHE ARMY AIRFIELD
SITE NO. J09CA024500
Supplemental 26 August 1999

PROJECT DESCRIPTION: During a recent investigation by the Rock Island District of the U.S. Army Corps of Engineers for preparation of an Archives Search Report (ASR) for the nearby Laguna Maneuver Area, it was discovered that a gunnery range was located on Blythe Army Airfield and large quantities of black powder spotting charges (for practice bombs) and high explosive bombs were stored in magazines. The ASR recommended further investigation of this site for OE potential. During a site visit on 2 June 1999 by Mr. Kyle Cook, remnants of the gunnery range were found, and spent 50-caliber slugs were observed scattered around the gunnery range. No evidence of ammunition storage at the gunnery range, or of explosives magazines structures, bombs, or explosive materials was observed during the site visit. Property disposal documentation indicates the site was decontaminated but no details of this process are provided.

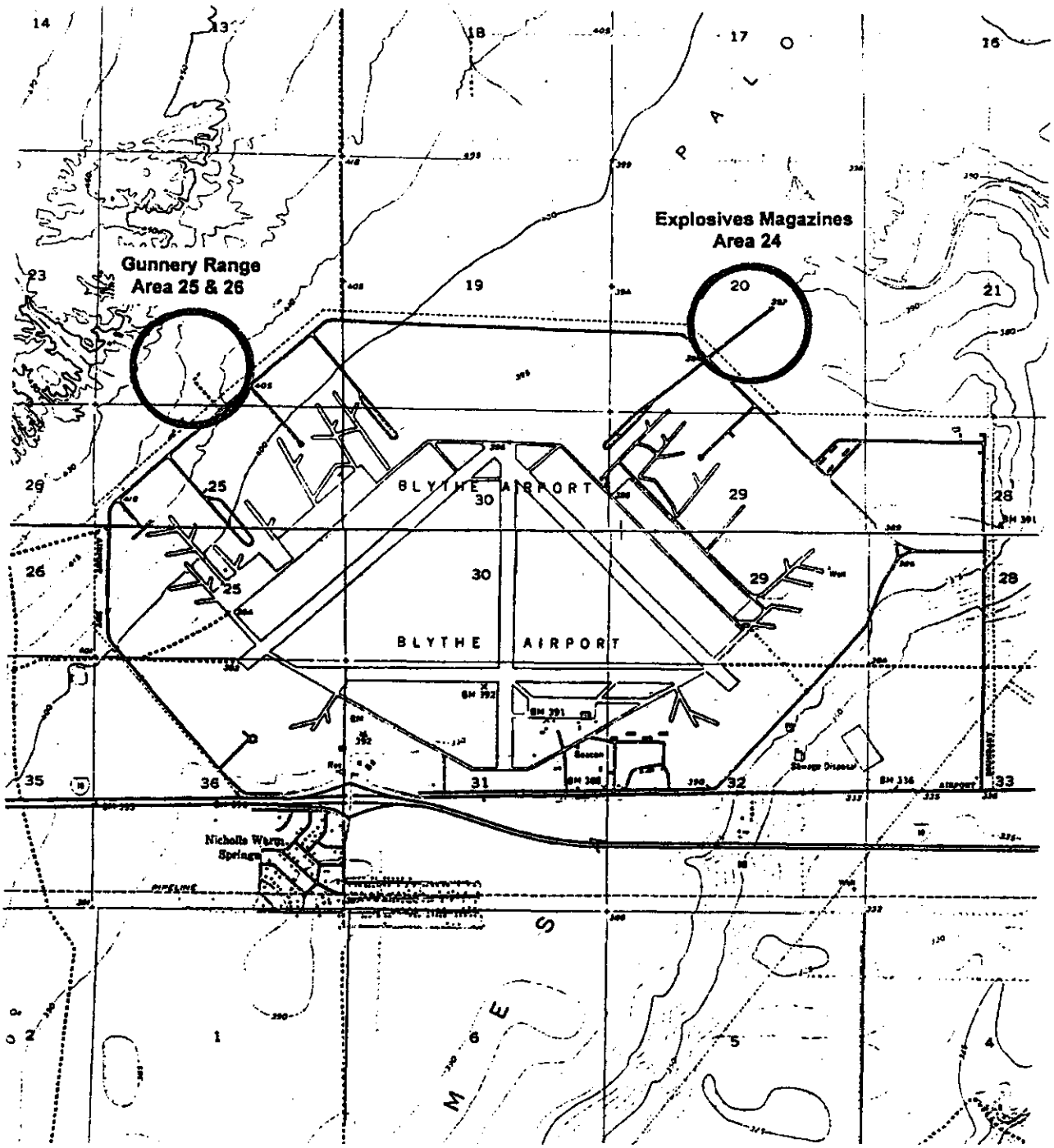
PROJECT ELIGIBILITY: The DOD controlled this property from approximately 1942 until 1944. Any OE found may be the result of past DOD activity.

POLICY CONSIDERATIONS: No policy considerations affect the proposal of this project.

PROPOSED PROJECT: Recommend Huntsville Engineering and Support Center make a determination if further action is appropriate.

RAC FORM: Attached.

DISTRICT POC: Request CEHNC inform Mr. Jeffery B. Armentrout at (213) 452-3720 when a determination is made regarding project status.



Reference: USGS Quadrangle McCoy Wash, Calif., Scale 1:24,000; Photorevised 1970 and USGS Quadrangle Ripley, Calif., Scale 1:24,000; Photorevised 1975. R21E and T6S.

N

Scale

0 1 mile

Science Applications International Corporation
An Employee-Owned Company

OE PROJECT MAP
Supplemental 23 June 1999
BLYTHE ARMY AIRFIELD
J09CA024502
Blythe, CA

PROJECT NO.		
01-0255-04-1541		
DRAWN BY	CHECKED BY	DATE
EB	KC	06-99

RISK ASSESSMENT PROCEDURES FOR ORDNANCE AND EXPLOSIVES (OE) SITES

Site Name Blythe Army Airfield
Site Location Blythe, CA
DERP Project # J09CA024502
Date Completed 23 June 99

Rater's Name Kyle Cook - SAIC
Phone Number (619) 546-6117
Organization L-A-Drsh
Score 3 Recommended-4

OE RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882C and AR 385-10. The Risk Assessment Code (RAC) score will be used by the U.S. Army Engineering and Support Center, Huntsville (USAESCH), Ordnance and Explosives Team (USAESCH-OE) to prioritize the remedial action(s) at Formerly Used Defense Sites (FUDS). The risk assessment should be based on the best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) Detachments actions, field observations, interviews, and measurements. This information is used to assess the risk involved based on the potential OE hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability. Personnel involved in visits to potential OE sites should view the USAESCH-OE videotape entitled "A Life Threatening Encounter: OEW".

Part 1. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible event resulting from personnel exposure to various types and quantities of unexploded ordnance.

TYPE OF ORDNANCE: (Circle all that apply)	VALUE
A. Conventional ordnance and ammunition:	
Medium/large caliber (20mm and larger)	10
Bombs, explosive	(10)
Grenades, hand or rifle, explosive	10
Landmine, explosive	10
Rockets, guided missile, explosive	10
Detonators, blasting caps, fuzes, boosters, bursters	6
Bombs, practice (w/spotting charges)	(6)

Grenades, practice (w/spotting charges)	4
Landmine, practice (w/spotting charges)	4
Small arms, complete round (.22 cal -.50 cal)	0
Small arms, expended	0
Practice ordnance (wo/spotting charges)	0

Conventional ordnance and ammunition (largest single value) 10

What evidence do you have regarding conventional unexploded ordnance? Site drawings and correspondence indicate storage of bombs and explosive materials. Expanded 50-caliber bullets found on the site

B. Pyrotechnics (for munitions not described above):	VALUE
Munition (containers) containing White Phosphorus (WP) or other pyrophoric material (i.e., spontaneously flammable)	10
Munition containing a flame or incendiary material (i.e., Napalm, Triethylaluminum metal incendiaries)	6
Flares, signals, simulators, screening smokes (other than WP)	4

Pyrotechnics (select the single largest value) 10

What evidence do you have regarding pyrotechnics? Site drawings only. No other records of use of these materials.

C. Bulk High Explosives (HE) (not an integral part of conventional ordnance; uncontainerized):	VALUE
Primary or initiating explosives (Lead Styphnate, Lead Azide, Nitroglycerin, Mercury Azide, Mercury Fulminate, Tetracene, etc.)	10
Demolition charges	10
Secondary explosives (PETN, Compositions A, B, C, Tetryl, TNT, RDX, HMX, HBX, Black Powder, etc.)	8

Military dynamite	6
Less sensitive explosives (Ammonium Nitrate, Explosive D, etc.)	3

High explosives (select the largest single value) 8

What evidence do you have regarding bulk explosives? Correspondence indicates storage and use of black powder spotting charges.

D. Bulk propellants (not an integral part of rockets, guided missiles, or other conventional ordnance; uncontainerized): VALUE

Solid or liquid propellants	6

Propellants 0

What evidence do you have regarding bulk propellants? _____

E. Chemical Warfare Materiel (CWM) and Radiological Weapons: VALUE

Toxic chemical agents (choking, nerve, blood, blister)	25
War Gas Identification Sets	20
Radiological	15
Riot Control Agents (vomiting, tear)	5

Chemical and Radiological (select the largest single value 0

What evidence do you have regarding chemical or radiological? _____

TOTAL HAZARD SEVERITY VALUE (Sum of value A through E (maximum of 61) 28

Apply this value to Table 1 to determine Hazard Severity Category

TABLE 1
HAZARD SEVERITY*

DESCRIPTION	CATEGORY	HAZARD SEVERITY VALUE
CATASTROPHIC	I	21 and/or greater
CRITICAL	II	10 to 20
MARGINAL	III	5 to 9
NEGLIGIBLE	IV	1 to 4
**NONE	V	0

*Apply Hazard Severity Category to Table 3

**If hazard severity value is 0, you do not need to complete Part II of this form. Proceed to Part III and use a RAC score of 5 to determine your appropriate action.

PART II. Hazard Probability. The probability that a hazard has been, or will be, created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used Department of Defense (DoD) site.

AREA, EXTENT, ACCESSIBILITY OF OE HAZARD (Circle all that apply)

A. Locations of OE hazards:	VALUE
On the surface	5
Within tanks, pipes, vessels, or other confined areas	4
Inside walls, ceilings, or other building/structure	3
Subsurface	2
Location (select the single largest value)	2

What evidence do you have regarding location of OE? Based on site observations there were no unexploded hazards on the surface, only spent bullets.

B. Distance to nearest inhabited location/structure likely to be at risk from OE hazard (road, park, playground, building, etc.) — VALUE

Less than 1,250 feet	5
1,250 feet to 0.5 mile	4
0.5 mile to 1.0 mile	3
1.0 mile to 2.0 Miles	2
Over 2 miles	1

Distance (select the single largest value) 3

What are the nearest inhabited structures/buildings? Airport administration and operation and fire department

C. Number(s) of building(s) within a 2-mile radius measured from the OE hazard area, not the installation boundary. — VALUE

26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0

Number of buildings (select the single largest value) 3

Narrative: Airport and some residential farther away from airport

D. Types of Buildings (within a 2 mile radius) — VALUE

Educational, child care, residential, hospitals hotels, commercial, shopping centers	5
Industrial, warehouse, etc.	4

Agricultural, forestry, etc.	3
Detention, correctional	2
No buildings	0
Types of buildings (select the single largest value	5

Describe the types of buildings: Fire department, airport operations, residential housing

E. Accessibility to site refers to access by humans to ordnance and explosives. Use the following guidance:	VALUE
No barrier nor security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security Guard, but no barrier	2
Isolated site	1
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel continuously monitors and controls entry; or, an artificial or natural barrier (e.g., fence combined with a cliff) which completely surrounds the area; and, a means to control entry at all times through the gates or other entrances (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the area).	0
Accessibility (select the single largest value)	1

Describe the site accessibility: The site is somewhat remote and not easily accessible

F. Site Dynamics. This deals with site conditions are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion on beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

VALUE

Expected	5
None anticipated	0

Site dynamics (select value) 0

Describe the site dynamics;

TOTAL HAZARD PROBABILITY VALUE (sum of largest values for A through F (maximum of 30) 14

Apply this value to Hazard Probability Table 2 to determine the Hazard Probability Level.

TABLE 2
HAZARD PROBABILITY

DESCRIPTION	LEVEL	HAZARD PROBABILITY VALUE
FREQUENT	A	27 or greater
PROBABLE	B	21 to 26
OCCASIONAL	C	15 to 20
REMOTE	D	8 to 14
IMPROBABLE	E	less than 8

*Apply Hazard Probability Level to Table 3.

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table. Enter the results of the Hazard Probability and Hazard Severity values.

TABLE 3

PROBABILITY LEVEL	FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
SEVERITY CATEGORY:					
CATASTROPHIC I	1	1	2	3	4
CRITICAL II	1	2	3	4	5
MARGINABLE III	2	3	4	4	5
NEGLIGIBLE IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

RAC 1 Expedite INPR, recommending further action by USAESCH-Immediately call USAESCH-OE-S (comm 256-895-1582/1598).

RAC 2 High priority on completion of INPR-Recommend further action by USAESCH.

RAC 3 Complete INPR-Recommend further action by USAESCH.

RAC 4 Complete INPR-Recommend further action by USAESCH.

RAC 5 Usually indicates that No DOD Action Indicated (NDAI) is necessary, Submit NDAI and RAC to USAESCH.

PART IV. Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.

See attached justification.

RAC JUSTIFICATION
FOR
PROJECT NO. J09CA024502
BLYTHE ARMY AIRFIELD
DERP-FUDS SITE NO. J09CA024500
BLYTHE, CALIFORNIA
Supplemental: 26 August 1999

This site is currently the Blythe City Airport. A few airport administration and operations buildings are present on the site and some residential dwellings are located across the Interstate from the site. However, the outer portions of the airfield where ordnance and explosive (OE) materials were used and stored are mostly undeveloped desert land that is somewhat remote. Some of this area was cleared and used for agricultural purposes (crops), but this has been discontinued.

Historical documents indicate the presence and use of a gunnery range and explosives magazines on-site, and the possible presence of incendiary and pyrotechnic magazines. Remnants of the gunnery range and spent 50-caliber bullets in this area still exist. No remnants of the explosives or other magazines were found on-site. OE was not discovered during the recent site inspection, but may still be a concern. Property disposal documentation indicates the site was decontaminated but no details of this process are provided.

An OE risk assessment score of three (3) was calculated for this site. This score is calculated based primarily on the historical accounts of ordnance storage and use. The findings for the site do not appear to support this calculated score. A score of 4 is recommended indicating the potential threat of subsurface ordnance or munitions to personnel be evaluated.

EXHIBIT 338

ATTACHMENT 3

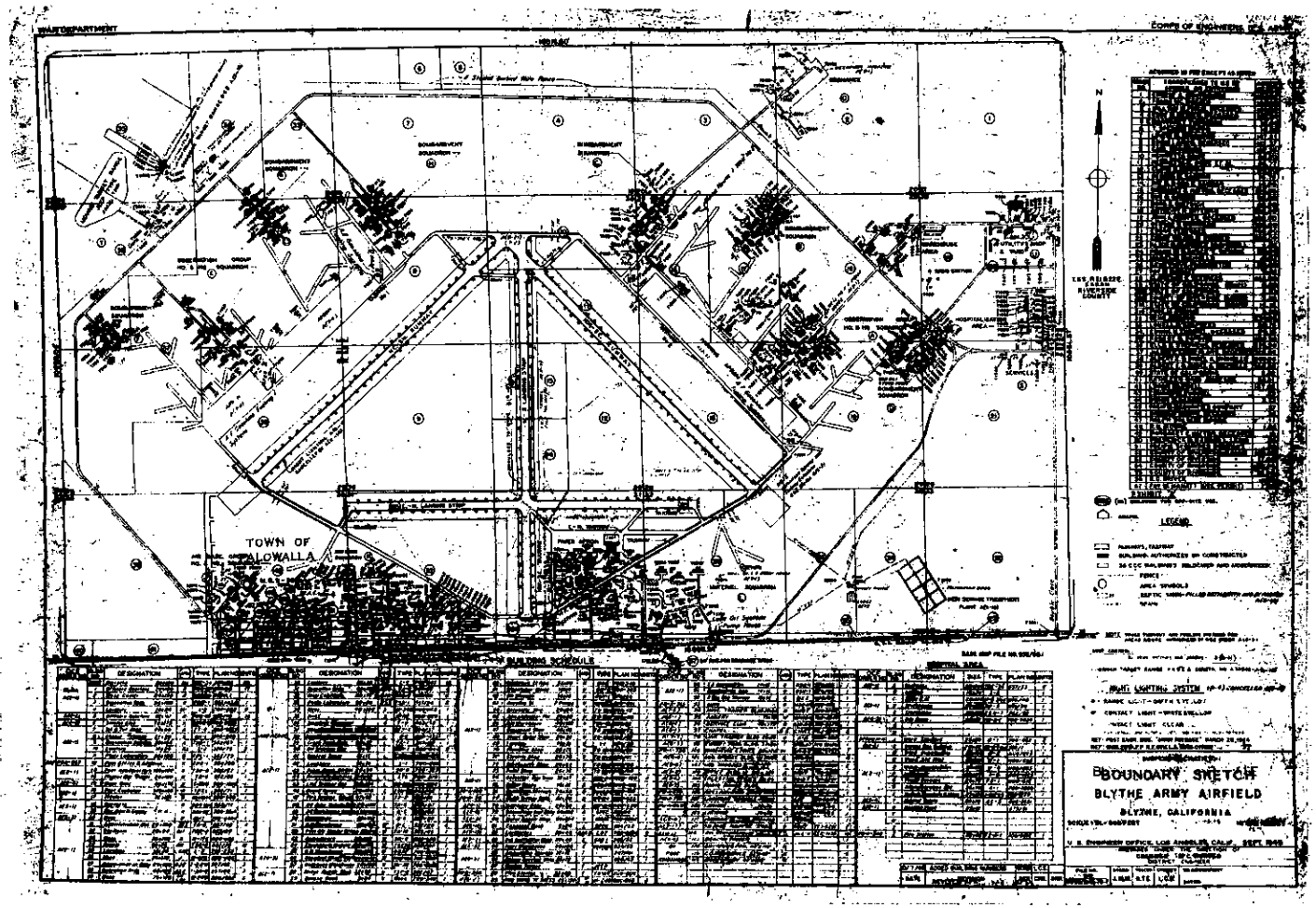

WAR DEPARTMENT
CORPS OF ENGINEERS, U.S. ARMY
TOWN OF
PALOWALLA
BUILDING SCHEDULE
LEGEND
BOUNDARY SKETCH
BLYTHE ARMY AIRFIELD
BLYTHE, CALIFORNIA

EXHIBIT 339

ATTACHMENT 4

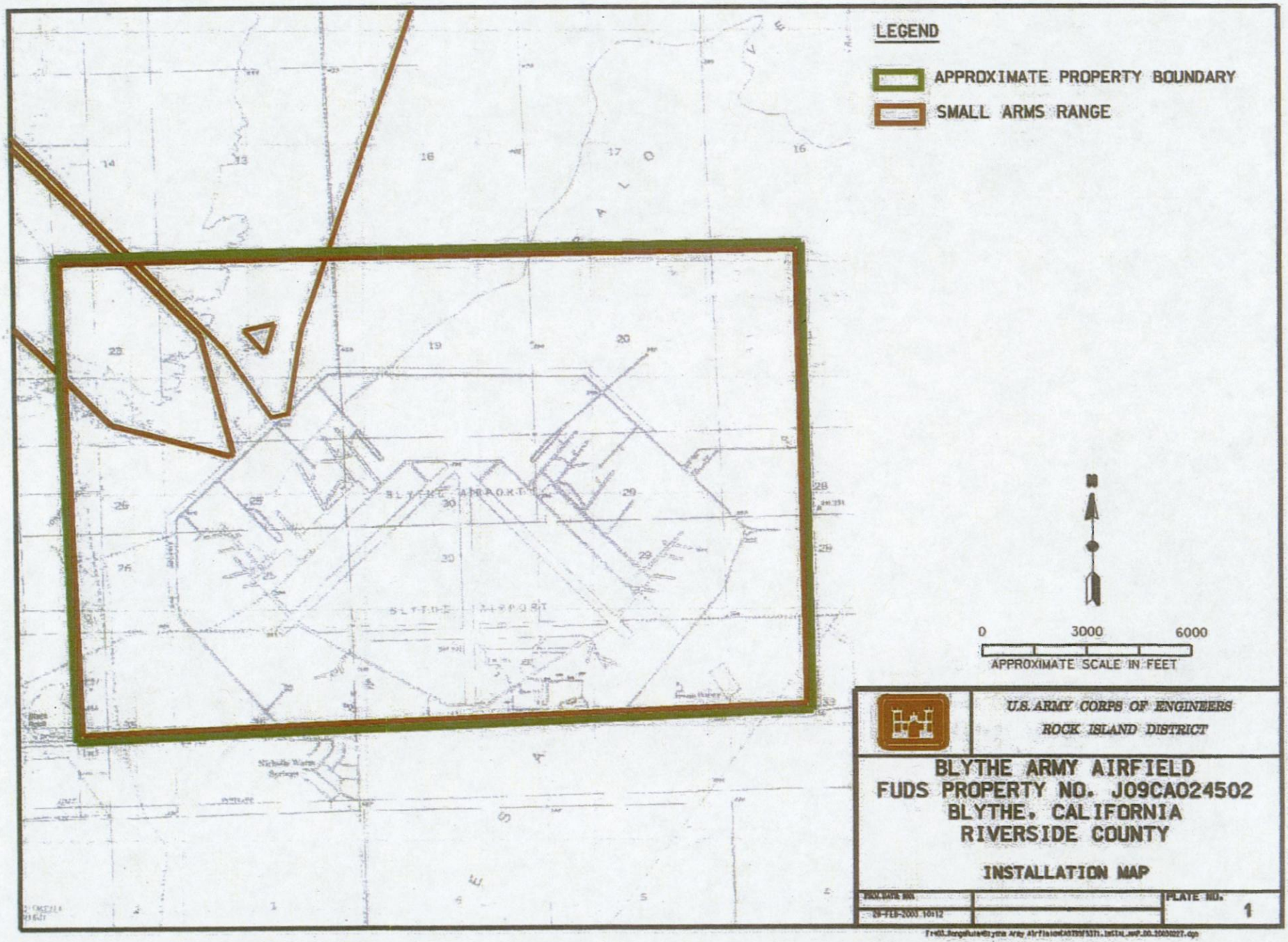

LEGEND
APPROXIMATE PROPERTY BOUNDARY
SMALL ARMS RANGE
N
0
3000
6000
APPROXIMATE SCALE IN FEET
U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT
BLYTHE ARMY AIRFIELD
FUDS PROPERTY NO. J09CA024502
BLYTHE, CALIFORNIA
RIVERSIDE COUNTY
INSTALLATION MAP
PLATE NO.
1

EXHIBIT 340

ATTACHMENT 4

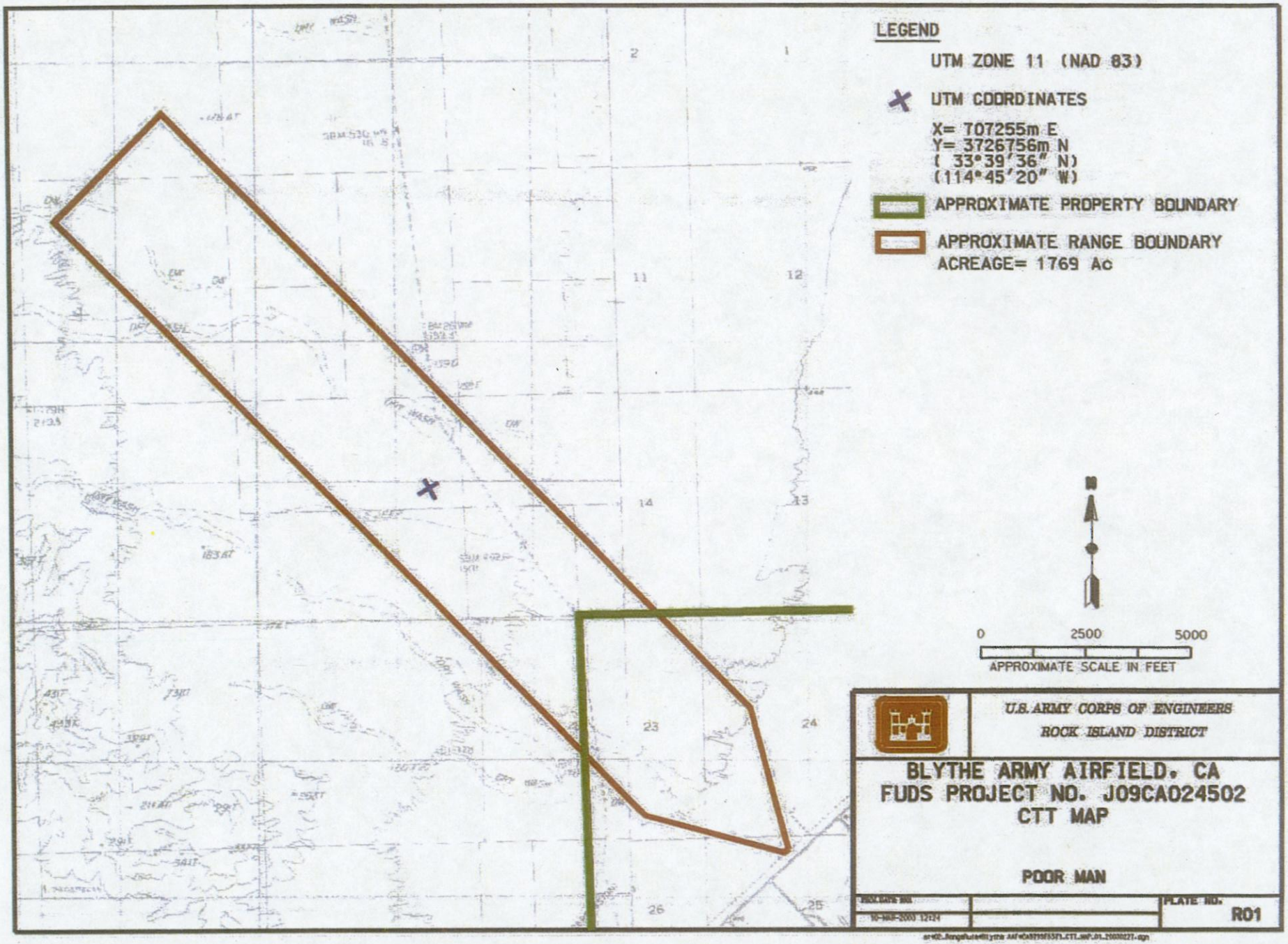
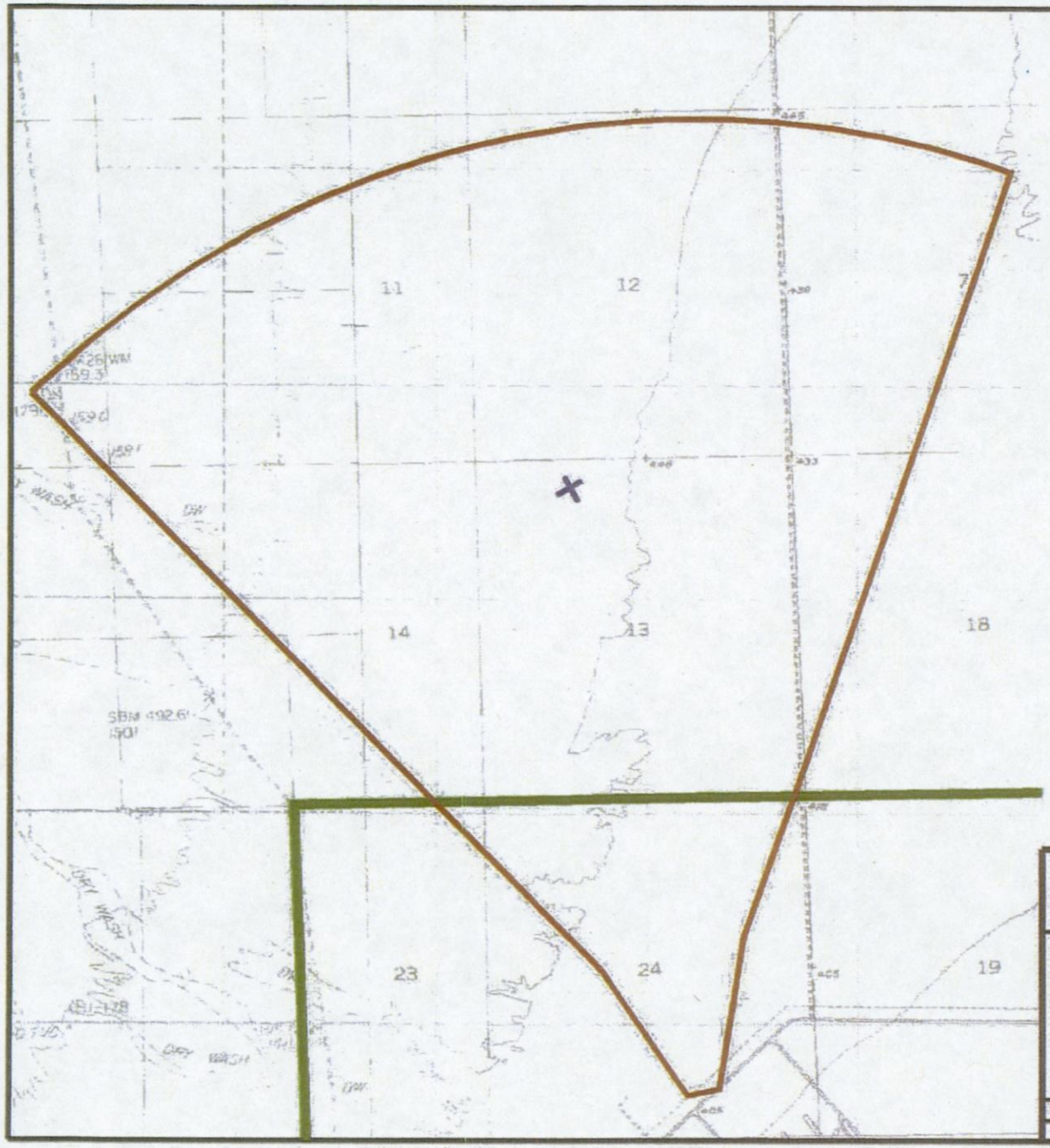

LEGEND
UTM ZONE 11 (NAD 83)
UTM COORDINATES
X= 707255m E
Y= 3726756m N
(33°39'36" N)
(114°45'20" W)
APPROXIMATE PROPERTY BOUNDARY
APPROXIMATE RANGE BOUNDARY
ACREAGE= 1769 Ac
N
0
2500
5000
APPROXIMATE SCALE IN FEET
U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT
BLYTHE ARMY AIRFIELD, CA
FUDS PROJECT NO. J09CA024502
CTT MAP
POOR MAN
PLATE NO.
R01

EXHIBIT 341

ATTACHMENT 4



LEGEND

UTM ZONE 11 (NAD 83)

UTM COORDINATES
X= 709648m E
Y= 3726756m N
(33°39'36" N)
(114°44'20" W)

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE RANGE BOUNDARY
ACREAGE= 2782 Ac

N

0 2000 4000
APPROXIMATE SCALE IN FEET

U.S. ARMY CORPS OF ENGINEERS
ROCK ISLAND DISTRICT

BLYTHE ARMY AIRFIELD, CA
FUDS PROJECT NO. J09CA024502
CTT MAP

JEEP RANGE

PLATE NO. R02

EXHIBIT 342

ATTACHMENT 5

US Army Corps of Engineers
Rock Island District

Defense Environmental Restoration Program
For
Formerly Used Defense Sites
Ordnance and Explosives

Archives Search Report

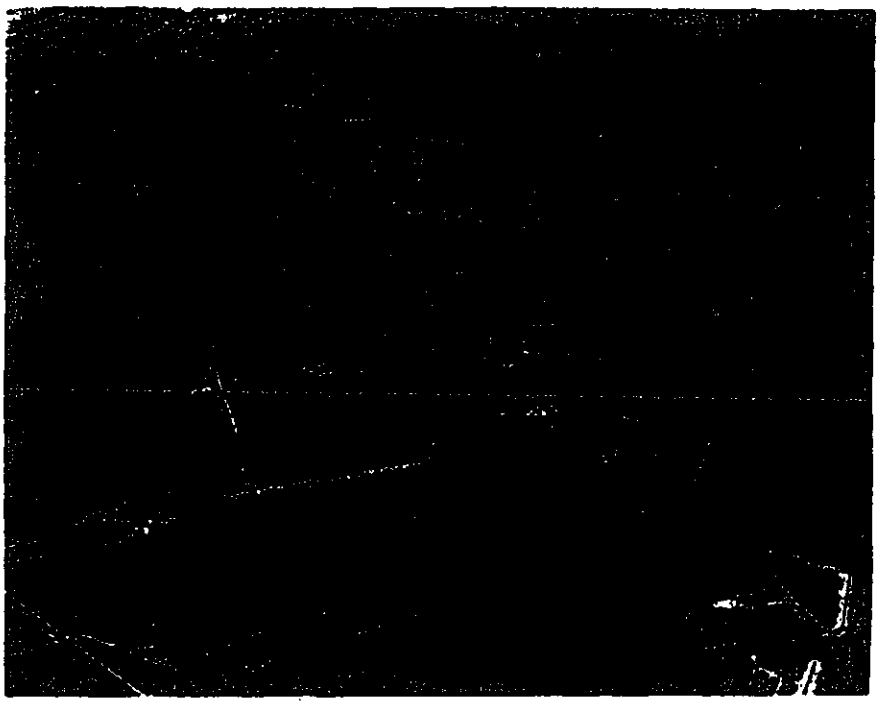
FINDINGS

for the former

NELLIS SMALL ARMS RANGE

LAS VEGAS, NEVADA
Project Number J09NV051001

July 1996



Moving Target Ranges at
the Las Vegas Gunnery School

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

for
FORMERLY USED DEFENSE SITES

FINDINGS

ORDNANCE AND EXPLOSIVES ARCHIVES SEARCH REPORT for the former NELLIS SMALL ARMS RANGE LAS VEGAS, NEVADA PROJECT NUMBER J09NV051001

July 1996

Prepared For
U.S. Army Engineering and Support Center, Huntsville
ATTN: CEHNC-OE
P.O. BOX 1600
Huntsville, Alabama 35807-4301

Prepared By
U.S. Army Corps of Engineers
Rock Island District
ATTN: CENCR-ED-DO
P.O. Box 2004
Rock Island, Illinois 61204-2004

and

U.S. Army Defense Ammunition
Center and School
ATTN: SIOAC-ESL
Savanna, Illinois 61074-9639

ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
for the former
NELLIS SMALL ARMS RANGE
LAS VEGAS, NEVADA
PROJECT NUMBER J09NV051001

ACKNOWLEDGMENT
The following persons provided support as indicated.

Function	Name	Title	Organization	Telephone
On-site Assessment	*Michael La Forge	Q.A. Spec., Ammunition (QASAS)	SIOAC-ESL	(815)273-8762
	Nick Iaiennaro	UXO Safety Spec.	CENCR-ED-DO	(309)794-6056
	Michael Patterson	Q.A. Spec., Ammunition (QASAS)	SIOAC-ESL	(815)273-8763
Engineering Support	Daniel J. Holmes	Professional Engineer	CENCR-ED-DO	(309)794-5480
Technical Records Search	Tom Meekma	QASAS	SIOAC-ESL	(815)273-8739
Geographic District Support	Gregory H. Boghossian	Project Manager	CESPL-ED-MI	(213)894-3574
Industrial Hygiene	Bob Platt	Industrial Hygienist	MCXP-RIA	(309)782-0806
CADD	Tom Geerling	Technician	CENCR-ED-DO	(309)794-6003

*Team Leader

ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
for the former
NELLIS SMALL ARMS RANGE
LAS VEGAS, NEVADA
PROJECT NUMBER J09NV051001

FINDINGS

TABLE OF CONTENTS

Section Page

1. INTRODUCTION..... 1

   a. Subject and Purpose
   b. Scope

2. PREVIOUS INVESTIGATIONS/PROJECTS..... 2

   a. 1994 Preliminary Assessment
   b. Other Investigations

3. SITE DESCRIPTION..... 2

   a. Existing Land Usage
   b. Climatic Data
   c. Topography
   d. Geology and Soils
   e. Hydrology
   f. Natural Resources
   g. Historical/Cultural Resources

4. HISTORICAL ORDNANCE PRESENCE..... 6

   a. Chronological Site Summary
   b. Ordnance Related Records Review
   c. Interviews with Site Related Personnel

5. SITE ELIGIBILITY..... 9

   a. Confirmed Formerly Used Defense Site
   b. Potential Formerly Used Defense Site

6. VISUAL SITE INSPECTION..... 9

   a. General Procedures and Safety
   b. Area A: Buried 37mm HE Area
   c. Area B: Bomb Jettison Area
   d. Area C: Bomb Jettison Area
   e. Area D: Bomb Jettison Area
   f. Area E: Bomb Jettison Area

7. EVALUATION OF ORDNANCE HAZARDS.....11

a. General Procedures
b. Area A: Buried 37mm Area
c. Area B: Bomb Jettison Area
d. Area C: Bomb Jettison Area
e. Area D: Bomb Jettison Area
f. Area E: Bomb Jettison Area

8. SITE ORDNANCE TECHNICAL DATA.....13

a. End Item Technical Data
b. Chemical Data of Ordnance Fillers

9. OTHER ENVIRONMENTAL HAZARDS.....16

a. Hazardous, Toxic, and Radiological Waste
b. Building Demolition/Debris Removal

APPENDICES

A. REFERENCE SOURCES.....
B. GENERAL REFERENCES AND ABSTRACTS.....
C. GLOSSARY.....
D. TEXTS/MANUALS.....
E. REPORTS/STUDIES.....
F. LETTERS/MEMORANDUMS/MISCELLANEOUS ITEMS.....
G. REAL ESTATE DOCUMENTS.....
H. NEWSPAPERS/JOURNALS.....
I. INTERVIEWS.....
J. PRESENT SITE PHOTOGRAPHS.....
K. HISTORICAL PHOTOGRAPHS.....
L. REFERENCE MAPS/DRAWINGS .....
M. ARCHIVES SEARCH REPORT CORRESPONDENCE.....
N. REPORT DISTRIBUTION LIST.....

TABLES

2-1 DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS.....
3-1 CURRENT LAND USAGE.....
3-3 NATURAL RESOURCES.....
8-1 AMMUNITION USED AND EXPLOSIVES/CHEMICAL FILLERS.....
8-2 CHEMICAL DATA OF EXPLOSIVE/ORDNANCE FILLERS.....

REPORT PLATES

1. SITE MAP.....
2. FACILITY LAYOUT CIRCA 1943.....
3. PROJECT AREAS.....
4. CURRENT OWNERSHIP/PHOTO LOCATIONS.....

ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
For the former
NELLIS SMALL ARMS RANGE
LAS VEGAS, NEVADA
PROJECT NUMBER J09NV051001

1. INTRODUCTION

a. Subject and Purpose

(1) This report presents the findings of an historical records search and site inspection for ordnance and explosives (OE) presence located at the former Nellis Small Arms Range. The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP FUDS).

(2) The investigation focused on 36,378.28 acres of land that was used initially by the Army Air Force as a ground gunnery range during WW-II and later by the Air Force as an emergency jettison area and explosive ordnance disposal (EOD) area.

(3) The purpose of this investigation was to characterize the site for potential OE contamination, to include conventional ammunition and chemical warfare material (CWM). The investigation was conducted by experienced ordnance experts through thorough evaluation of historical records, interviews, and on-site visual inspection results.

b. Scope

(1) This report presents the site history, site description, real estate ownership information, and confirmed ordnance presence (prior to and after site closure), based on available records, interviews, site inspections, and analyses. The analyses provide a complete evaluation of all information to assess current day potential ordnance contamination, where actual ordnance presence has not been confirmed.

(2) For the purpose of this report, OE contamination consists of live ammunition, live ammunition components, CWM, or explosives which have been lost, abandoned, discarded, buried, fired or thrown from demolition pits or burning pads. These items were either manufactured, purchased, stored, used, and/or disposed of by the War Department/Department of Defense. Such ammunition/components are no longer under accountable record control of any DOD organization or activity.

(3) **Expended** small arms ammunition (.50 cal or smaller) is not considered OE contamination. OE further includes

"explosive soil" which refers to any mixture in soil, sands, clays, etc., such that the mixture itself is explosive. Generally, 10 percent or more by weight of secondary explosives in a soil mixture is considered explosive soil.

2. PREVIOUS INVESTIGATIONS/PROJECTS

a. 1994 Preliminary Assessment

(1) A Preliminary Assessment of the Nellis Small Arms Range was conducted under the Defense Environmental Restoration Program, Formerly Used Defense Sites (DERP FUDS) by the Corps of Engineers, Los Angeles Division (see reference B-1). At that time, the Findings and Determination of Eligibility (FDE), dated 30 August 1994, concluded that 36,378.28 acres had been formerly owned or used by the Army Air Force/Department of Defense.

(2) The FDE concluded that there were eligible categories under the DERP/FUDS program. Since the site was found to have been used as a training, demolition, and jettison area, an Ordnance and Explosives (OE) project was recommended, DERP FUDS Project Number J09NV051001, which is the subject of this report (see document E-3).

TABLE 2-1
DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS

Project Number	DERP Category	Present Phase	Comments	Location
J09NV051001	OE	SI	Ordnance and Explosives	See plate 3
	BD/DR	-	None Recommended	
	HTRW	-	None	

b. Other Investigations

No other investigations or studies relevant to DERP-FUDS were discovered during this Archives Records Search.

3. SITE DESCRIPTION

a. Existing Land Usage

(1) The former Nellis Small Arms Range is located in Clark County, 6 miles northeast of Las Vegas, Nevada and 2 miles north of Nellis Air Force Base.

(2) Part of the property is used by the U.S. Fish and Wildlife Service as part of the Desert Game Range; the remainder of the property is owned by the Bureau of Land Management and is used primarily for public access and recreational activity. An active U.S. Air Force small arms range abuts this area on the southeast corner but is not considered part of the FUDS (see plate 3).

(3) Table 3-1 shows current land usage.

TABLE 3-1
CURRENT LAND USAGE

AREA	FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES	COMMENTS
A	37mm Burial Area	BLM	Wildlife Mgmt.	2,782	See plates 3,4
B	Bomb Jettison Area	FWS	Wildlife Mgmt.	9,267	See plates 3,4
C	Bomb Jettison Area	BLM	Wildlife Mgmt.	8,016	See plates 3,4
D	Bomb Jettison Area	BLM	Recreation	1,094	See plates 3,4
E	Bomb Jettison Area	BLM	Recreation	15,219.28	See plates 3,4
			Total Acres:	36,378.28	

b. Climatic Data

(1) Material in paragraphs 3.b.(2) through (4) was extracted primarily from the Local Climatological Data, Annual Summary With Comparative Data for Las Vegas, Nevada, dated 1993 (see reference B-7).

(2) Clark County is located in the southwestern portion of the state. Weather factors for the Las Vegas recording station are used in this assessment. The factors that determine weather patterns include location of Nevada on the eastern, lee side of the Sierra Nevada Mountains, prevailing winds from the west that drop precipitation on the western side of the Sierras, and wild local variations due to differences in topography and elevation.

(3) The annual precipitation averages 4.21 inches (1964-1993 avg. mean). The wettest months are usually March and January. The months with the least amounts of precipitation are May and June (see reference B-8).

(4) The average temperature ranges from daily minimums in January and December of 32.7 to 33.6° F to daily mean high temperatures of 83.5-89.8° F in June, July, and August. The lowest temperature observed was 8°F in January and the highest temperature was 116° F in July (see reference B-8). Mean number of days with temperatures over 90° F is 132. Mean number of days 32° F and below is less than one-half (see reference B-7).

(5) The average snowfall each winter is from a trace to up to 16.7 inches. The relative humidity averages from 21 to 40 percent throughout the course of the day (see references B-7 and B-8).

(6) Flooding, especially flash flooding, is likely to occur in the area of the site after thunderstorms due to the topography and soil consistencies (see reference B-7).

c. Topography

(1) Clark County lies on the southern edge of the state and is part of the Great Basin. Average elevations in the area of the site are from 3,000 to 7,800 feet. The terrain varies quite sharply from steep, craggy mountains to broad alluvial fans on the valley floor.

(2) The site is traversed by gullies, canyons, and arroyos making transportation difficult. Roads are generally jeep tracks and impassable during certain portions of the year.

d. Geology and Soils

(1) Material in paragraphs 3.d.(2) and 3.d.(3) was extracted from the current Soil Survey of Clark County, Nevada (see reference B-40).

(2) Regional Geology/Soils

(a) The geology of Clark County is generally categorized by beginning with the sedimentary formations in the mountains that have gravitated to the basin floor. This in turn becomes alluvial fan piedmont characterized by coalescing fans dissected by numerous drainage channels. Sedimentary formations of dolomite and limestone from the early Cambrian to the early Devonian are present, with the occasional appearance of interbedded quartzite, and shale beds. The Tertiary rock in the mountains ringing the site area are mainly basalt, rhyolite and latite and classified as volcanic extrusions. The valley floors

that make up the main portion of the site are quarternary in nature, made up of a detritus from the bedrock areas carried by intermittent flash flooding to the margins of valleys and alluvial fans. Larger amounts of coarse debris are deposited along the edges of dry watercourses (see reference B-40).

(b) The soil is of all sizes of rock debris ranging from clay-sized fragments to boulders. The soil is not suited for agricultural purposes and lack of water kills all but the hardiest desert shrubs.

(3) Site Specific Geology/Soils

The soil on this site is Weiser extremely gravelly fine sandy loam with 2 to 8 percent slopes (see reference B-40). the Weiser series consists of very deep, well drained soils on erosional fan remnants. The soil is largely derived from limestone. About 80 percent of this soil type is actually small pebbles. A dark desert varnish is found on the exposed surfaces of these rock fragments. Calcium carbonate content ranges 40 to 60 percent, confirming the limestone foundation of this soil. The fine earth fraction averages fine sandy loam or sandy loam and has a clay content of 5 to 18 percent. The profile is moderately or strongly alkaline. This is the only soil type on the site.

e. Hydrology

The 4.21 inch average rain fall for the Las Vegas area is a reliable estimate for this area due to proximity of the site to Las Vegas. (see reference B-11). Surface water on this site is runoff from the mountainous areas to the north and northeast of the site. Small springs and seeps are located in several places on the site but these are largely seasonal and provide no steady supply of water.

f. Natural Resources

(1) There are several endangered animals and plants listed as endangered species to be protected in this portion of Nevada by the Department of the Interior, U.S. Fish and Wildlife Service (see reference B-6).

(2) The following species are recognized as threatened, endangered, or sensitive by the State of Nevada or the Federal Government and are presented in tabular form in table 3-3:

TABLE 3-3 NATURAL RESOURCES*		
Resource Classification	Type	Comment
Mammal	None	
Bird	None	
Amphibian/Reptile	Desert Tortoise Amargosa Toad	E (F,N) T (F)
Fish	Pahrump Poolfish Warm Springs Pupfish	E (F) E (F)
Plant	Amargosa Niterwort Mojave Sweet Pea	E (F) S (F)
Insect	None	
E = Endangered N = Nevada *References B-6 and B-10	S = Sensitive T = Threatened	F = Federal

g. Historical/Cultural Resources

According to the State Historical Preservation Office (SHPO) for Nevada, maintenance of an inventory of historic and cultural sites is contracted to the University of Nevada at Las Vegas' Harry Reid Center for Environmental Studies. Ms. Blair of that office informed the HRS researcher for this site that the least expensive and most feasible way to inventory and categorize historical/cultural sites was to do so after it had been determined which areas are to be remediated. No information specific to the site was discovered, however, when remediation is considered for this site, the SHPO should be contacted for specific guidance (see appendix A, Reference sources).

4. HISTORICAL ORDNANCE PRESENCE

a. Chronological Site Summary

(1) The site was authorized to be acquired from the Department of the Interior as part of a 4,043,339.55 acre tract specified in Executive Order 8578, 29 October 1940, for use as a bombing and gunnery range (see reference B-31). The 46,953.75 acre area was transferred from the Department of the Interior in December 1941 to be used as a moving target machine gun range.

Approximately 25,620 acres were relinquished to the Bureau of Land Management (BLM) in August 1954. An additional 10,758.27 acres were relinquished to the Fish and Wildlife Service in July 1961. The site was used by Air Force, Marine Corps and Navy personnel from Nellis Air Force Base and Lake Mead Base for small arms weapons ranges. The site was also used as an emergency drop area for hung bombs, wing-tip tanks and pylons. The Air Force also utilized a portion of the area as an explosive ordnance disposal area. Numerous range clearances have been conducted and are documented in appendix F. OE continues to be discovered on the site. The Air Force Small Arms Range which is adjacent to this site is active and still in use. Its acreage is not considered in this report.

b. Ordnance Related Records Review

(1) Sources checked in the search for any OE contamination included:

[a] National Archives
[b] Regional Archives
[c] The Military History Institute
[d] U.S. Army Center for Military History
[e] Emergency Ordnance Disposal (EOD) Units
[f] Local Police Department
[g] Local Sheriff's Department
[h] County Courthouse

(2) For a complete list of sources checked, see appendix A, Reference Sources.

(3) Documentation discovered in the course of the Archives Search showed that the former Nellis Small Arms Range was first envisioned before World War II for training flexible machine gunners assigned to the Las Vegas Bombing and Gunnery School (see F-1). Numerous documents refer to construction of ranges and ammunition supply and logistics matters (see F-2 to F-4) necessary to properly run a training area. Power turrets were requested in December 1941 (see F-5). References F-6 and F-7 discuss a request for the delivery of 20mm and 37mm AA guns. The use of tracer shotgun ammunition is discussed in reference F-8. The moving target ranges and numbers of students expected to be trained are discussed in reference F-9. The aforementioned documents all date from World War II. The next two references discuss the construction of a 600 yard rifle range in 1955 to be jointly shared by Nellis Air Force Base and Lake Mead Base (see F-9).

(4) Explosive Ordnance Disposal team range clearance documents exist and were carefully studied to determine areas of confirmed and potential OE contamination, as well as density of that contamination. Clearances were conducted in 1972, 1977, 1978 and 1995.

Large amounts of OE were recovered (see references F-10, F-11, F-12, and F-13). These documents were responsible in part for the risk assessments for this site.

(5) A declaration of excess dated June 1971 details the types of munitions items that could be expected to be found on the range (see reference G-2 and map L-3). Included were practice bombs and HE rockets.

(6) Review of newspaper microfilm, clipping files, and vertical files at the Nevada Room of the Las Vegas Central Library revealed no evidence of the discovery of OE at the former Nellis Small Arms Range.

c. Interviews with Site Related Personnel

(1) CPT Swoboda, Nellis AFB EOD, had a wealth of information concerning OE at the former Nellis Small Arms Range. His unit does the range clearances on the active portions of the Nellis Range and would be the responders if ordnance was discovered in/on FWS/BLM lands, like Nellis Small Arms Range, that border the active Range. He was the officer in charge of the last range clearance of the area and his final report with OE recovered and map of their locations is at reference F-13. He stated that OE items discovered off range are recovered by Nellis ordnance personnel in the interest of public safety (see interview I-1).

(2) SSG Quinn, 259th EOD, Fort Irwin was the staff duty NCO. SSG Quinn had no information on discovery or removal of ordnance and munitions items in the former Nellis Small Arms Range area. He acknowledged that his unit does have responsibility for the area in which Nellis Small Arms Range is located, but, in practice, leave discoveries of Air Force munitions for the Air Force's disposition. He suggested I speak with Air Force EOD personnel and gave me a POC (see interview I-1). He had no other pertinent information (see interview I-2).

(3) Dr. Wilman is the Staff Historian for WTC and is very familiar with all aspects of the Nellis Range Complex. She was familiar with instances of OE being discovered in the area where Nellis Small Arms Range is located. She has intensively searched the archives for us in this respect after prior coordination with the HRS team's Mr. Meekma. She directed us to

EOD Captain Swoboda (interview I-1)(see interview I-3).

(4) Mr. Cook is currently an employee of the Bureau of Land Management in Las Vegas and is quite familiar with the property in question at the former Nellis Small Arms Range. He has visited the property several times in the course of his duties and has never seen any evidence of OE in the area. He is familiar with OE from his time in the military and spoke knowledgeably about military activities in the surrounding areas including other FUDS sites now under study (see interview I-4).

5. SITE ELIGIBILITY

a. Confirmed Formerly Used Defense Site

(1) Former land usage by the Army was previously confirmed for the entire 36,378.28 acre site as summarized in section 4 of this report.

(2) There are no recapture or restricted use documents on record for the former Nellis Small Arms Range.

b. Potential Formerly Used Defense Site

No previously unknown potential Formerly Used Defense Sites were identified by the site inspectors during the course of the visual inspection and review of historical documents.

6. VISUAL SITE INSPECTION

a. General Procedures and Safety

(1) During the period 15-21 February 1996, members of the Site Inspection (SI) team traveled to Nevada to assess several FUDS including the portion of the former Nellis Small Arms Range returned to the public domain. The team did not visit the fenced, active range which is not a part of this report. The primary task of the SI team was to assess OE presence and potential due to the usage of the site as a machine gun range and emergency jettison area for the Las Vegas Bombing and Gunnery Schoolduring World War II. Contamination from present day usage of ordnance in areas adjacent or in the sky above the FUDS is not within the purview of the DERP-FUDS program and must be addressed separately.

(2) A site safety plan was developed and used by the SI team to assure an injury-free site inspection of the Former Nellis Small Arms Range. A briefing was conducted prior to the SI which stressed that OE would only be handled by military EOD personnel. Site safety and strict adherence to nonintrusive

investigation methods were maintained by the inspection team at all times during the on-site inspection.

(3) Prior to the site visit, a thorough review was made of available reports, historical documents, texts, and technical ordnance manuals (see materials referenced in Appendix A gathered during the ASR historical records search). This review was made to ensure team awareness of potential ordnance types and hazards.

(4) The actual inspection of the former Nellis Small Arms Range began on 16 February 1996, when the SI team visited the area of the site.

b. Area A: Buried 37mm HE Area

(1) The site was surveyed with the aid of a 4-wheel-drive vehicle and existing maps and drawings provided by Nellis EOD (see map L-3).

(2) The SI team first surveyed the portion of the site indicated as a potential ammunition burial site for 37mm HE by the INPR. This survey was conducted on foot with all appropriate cautions taken to avoid injury and heat fatigue. No of evidence of OE was noted. The area was walked by the assessment team three abreast, taking care to carefully inspect gullies similar to the ones mentioned in the EOD reports of 37mm found in the area (see plate 3, photograph J-1 and map L-3). Other OE items have also been discovered in this area (see reference F-13) but are most likely illicit dumps by disaffected individuals.

c. Area B: Bomb Jettison Area

This area is mountainous and not vehicle accessible; it was not inspected on foot. EOD personnel who have surveyed the area by helicopter verify the presence of OE such as rockets, practice bombs, and expended wing-tip tanks.

d. Area C: Bomb Jettison Area

This area is mountainous and not vehicle accessible; it was not inspected on foot. EOD personnel who have surveyed the area by helicopter verify the presence of OE such as rockets, practice bombs and expended wing-tip tanks.

e. Area D: Bomb Jettison Area

This area is mountainous and not vehicle accessible; it was not inspected on foot. EOD personnel who have surveyed the area by helicopter could not verify the presence of OE such as rockets, practice bombs and expended wing-tip tanks but think it likely due to it's designation as an emergency drop area and proximity to the air base.

f. Area E: Bomb Jettison Area

This large area was walked east to west by the assessment team members three abreast. Three of the former moving target berms are located on the southern edge of the site. No evidence of OE was noted. This area had large numbers of expended .50 caliber machine gun bullets from its use as an moving target machine gun range (see photographs J-2 and J-3). This area has had one inert M117 practice bomb removed by Nellis Air Force Base EOD (See reference F-13).

7. EVALUATION OF ORDNANCE HAZARDS

a. General Procedures

(1) The site was evaluated to determine confirmed, potential, or uncontaminated ordnance presence. Confirmed ordnance contamination is based on verifiable historical evidence or direct witness of ordnance items. Verifiable historical records evidence consists of ordnance items located on site and documented by the local bomb squad, Air Force and Army Explosive Ordnance Disposal teams, newspaper articles, correspondence, current findings, etc. Direct witness of ordnance items consists of the inspection team directly locating ordnance items by visual inspection. Additional field data is not needed to identify a confirmed subsite.

(2) Potential ordnance contamination is based on a lack of confirmed ordnance. Potential ordnance contamination is inferred from records or indirect witness. Inference from historical records would include common practice in production, storage, usage, or disposal, at that time, which could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or from present day site features. Additional field data is needed to confirm potential ordnance subsites.

(3) Uncontaminated ordnance subsites are based on a lack of confirmed or potential ordnance evidence. Historical records evidence and present day site inspections do not indicate confirmed or potential ordnance contamination. There is no reasonable evidence, either direct or inferred, to suggest present day ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance subsites.

b. Area A: Buried 37mm HE Area

(1) Based on the site visual inspection, review of historical documents, and reports of found OE since site closure,

this area is considered **contaminated** in accordance with the standards of paragraph 7.a.(1).

(2) OE has been recovered from this site by Nellis Air Force Base EOD personnel but the precise location was not detailed on a clearance map. 37mm HE projectiles show up after heavy rains and will probably continue to surface due to weather or real estate development. A portion of this area, section 17, also may have served as an EOD demolition area (see map L-3). The area must be treated as contaminated due to pit kick-outs, buried misfires, and the common practice of illicit burial of items.

c. Area B: Bomb Jettison Area

(1) Based on review of historical documents, and interviews with Nellis Air Force Base EOD personnel this area is considered **contaminated** in accordance with the standards of paragraph 7.a.(1).

(2) OE has been noted on the ground by EOD personnel doing aerial surveys of the area. The rugged, nearly inaccessible terrain complicates disposal and removal by Nellis AFB EOD.

d. Area C: Bomb Jettison Area

(1) Based on review of historical documents and interviews with Nellis Air Force Base EOD personnel this area is considered **contaminated** in accordance with the standards of paragraph 7.a.(1).

(2) OE has such as practice bombs have been noted on the ground by EOD personnel doing aerial surveys of the area. The rugged, nearly inaccessible terrain complicates disposal and removal by Nellis AFB EOD.

e. Area D: Bomb Jettison Area

(1) This area was broken out from Area C based on its accessibility. As a result of the site visual inspection, review of historical documents, and common practices of the time, this area is considered **potentially contaminated** in accordance with the standards of paragraph 7.a.(2).

(2) No OE was noted on the site. Individuals familiar with the site have found no evidence of OE contamination (see interviews I-1 and I-4). This area is adjacent to known contaminated and active use areas. This area could have been utilized if required to drop hung bombs and rockets, wing-tip tanks and weapons pylons. It would have been common practice to utilize the area as an emergency drop site; the possibility for contamination by OE exists and must be taken into consideration.

f. **Area E: Bomb Jettison Area**

(1) Based on the site visual inspection, review of historical documents, and reports of found OE since site closure, this area is considered **potentially contaminated** in accordance with the standards of paragraph 7.a.(2).

(2) Although three of the moving targets berms are located in this area, expended small arms are not the primary focus of study in this area since it is not considered OE. No OE was noted on the site during the assessment. One **inert** M117 practice bomb has been removed by EOD and is considered scrap metal and not OE. However, since the area is adjacent to known contaminated areas and an active training range the potential for buried and impacted OE items exists in this area. This area was also available for emergency jettisoning of bombs and racks and may be contaminated with OE.

8. SITE ORDNANCE TECHNICAL DATA

a. **End Item Technical Data**

(1) There is historical evidence to indicate that ordnance was used at the Nellis Small Arms Range over a 20-year period.

(2) Table 8-1 is a listing of OE items most likely to have been expended for gunnery training based on the scopes of the training missions and the timeframe 1941-1965as well as observed OE on-site:

TABLE 8-1
AMMUNITION USED AND EXPLOSIVES/CHEMICAL FILLERS

Type	Model	Filler/Weight
Cartridge, .30 caliber, MG	M2, Ball M1, Tracer M2, AP	Lead antimony Tracer composition Tungsten chrome steel
Cartridge, .30 caliber, Carbine	M1 Ball M16 Tracer	Lead antimony Tracer composition
Cartridge, .45 caliber, Pistol	M1911, Ball	5.6 grains Powder 4648 Copper Plated Steel Bullet
Cartridge, .50 caliber, Machine Gun	M2, Ball M2, AP	Soft steel/lead Tungsten chrome steel

TABLE 8-1
AMMUNITION USED AND EXPLOSIVES/CHEMICAL FILLERS

Type	Model	Filler/Weight
Projectile, 20mm HEI	MK IV	.0171 lb. Tetryl .0072 lb. Incend. mix.
Projectile, 37mm, HE-T	M54	.10 lb. Tetryl .025 lb. Tracer Comp.
Fuze	M56 PD	Tetryl booster
Grenade, Incendiary	AN-M14	1.75 lbs. thermite
Warhead, Rocket 2.75"	M229 HE	15.5 lbs. Comp. B
Block, Demolition	M3	2.25 lb. Comp. C-3
Block, Demolition	M4	.50 lb. Comp. C-3
Cord, Detonating		7 lb./100 feet PETN
Bomb, Practice 3 lb. w/signal	AN-MK 23 MK 4	Cast iron 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium tetrachloride
Bomb, Practice 4.5 lb. w/signal	AN-MK 43 MK 4	Cast lead 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium tetrachloride
Bomb, Practice 2.68 lb. w/signal	AN-MK 5 MK 4	Zinc Alloy 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium tetrachloride
Bomb Practice 5 lb. w/signal	MK 105 MK 4	Sheet steel 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder
Bomb, Practice 25 lb. w/signal	MK 76 MK 4	Sheet steel 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium tetrachloride

TABLE 8-1 AMMUNITION USED AND EXPLOSIVES/CHEMICAL FILLERS		
Type	**Model**	**Filler/Weight**
Bomb, Practice 100 lb. w/signal	M38A2	Sheet steel 10 gm zinc oxide 3 gm black powder 3 gm smokeless powder Titanium tetrachloride water/sand mix
Rocket, 5", HE	MK 1 Mod 0	8.6 lbs. TNT

b. **Chemical Data of Ordnance Fillers**

Table 8-2 has been developed to establish a list of typical explosive/chemical compounds used in the ordnance and chemical items cited in Table 8-1.

Table 8-2 CHEMICAL DATA OF EXPLOSIVE/ORDNANCE FILLERS		
EXPLOSIVE MATERIEL	**SYNONYM(S)**	**CHEMICAL FORMULA**
Smokeless Powder	FNH Powder	
Various percentages of:		
Nitrocellulose	Nitrocotton	$C_3H_5(ONO_2)_3$
Dinitrotoluene	DNT	$C_6H_2CH_3(NO_2)_2$
Dibutylphthalate	Gelling Agent	$C_6H_4(CO_2C_4H_9)_2$
Diphenylamine	DPA; Stabilizer	$(C_6H_5)_2NH$
Black Powder		
74% Potassium Nitrate	Niter, Salt Peter	KNO_3
11% Sulfur		S
16% Charcoal		C
TNT	2,4,6 Trinitrotolulene	$C_6H_2CH_3(NO_2)_3$
RDX		$C_3H_6N_6O_6$

Table 8-2 CHEMICAL DATA OF EXPLOSIVE/ORDNANCE FILLERS		
EXPLOSIVE MATERIEL	**SYNONYM(S)**	**CHEMICAL FORMULA**
Pentolite 50% TNT 50% PETN		
PETN	Pentaerythritetetranitrate	$C(CH_2ONO_2)_4$
Lead		Pb
Iron		Fe
Antimony		Sb
Primer Compositions*		
Mercury Fulminate		$Hg(ON)_2$
White Phosphorus	WP Smoke	P
Lead Azide		$Pb(N_3)_2$
Sulfur Trioxide	FS Smoke	S_2O_3
Tetryl		$C_7H_5N_5O_8$
Thermite		Al + FE

9. OTHER ENVIRONMENTAL HAZARDS

a. Hazardous, Toxic, and Radiological Waste

During the site visit and in the course of reviewing hundreds of documents during the historical records search, evidence of a HTRW consideration came to light due to expended .50 caliber machine gun bullets containing lead in area E of the site (see plates 2 & 3). Any remediation efforts should be coordinated with the Nellis Air Force Base Environmental office and the State of Nevada.

b. Building Demolition/Debris Removal

During the site visit, no potential BD/DR projects were noted for consideration as a result of DOD/AAF use during the period 1941-1963.

EXHIBIT 343

Declaration

I, Janet M. Laurain, declare as follows:

1. I am a paralegal at Adams Broadwell Joseph & Cardozo. I make this declaration from my personal knowledge. If called as a witness, I could testify competently to facts stated in this declaration.

2. On February 3, 2010, I submitted a Public Records Act Request for copies of all correspondence, analyses, memos, notes, electronic mail messages, files, charts, maps, and/or other documents referring or relating to the Blythe Solar Power Plant project to the California Department of Fish and Game.

3. On April 8, 2010, I received a response to my February 3, 2010 request. Attached as Exhibit 344 is a true and correct copy of the California Department of Fish and Game's response to my February 3, 2010 request.

4. The following documents were attached with the April 8, 2010 response:

A. Email from Shelly Dayman to Tannika Engelhard re Solar Millennium – Desert Tortoise Surveys, Blythe Site (5/26/09), included as Exhibit 345.

5. I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed this 15th day of June, 2010, at South San Francisco, California.

Janet M. Laurain

Janet M. Laurain

EXHIBIT 344

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
Office of the General Counsel
1416 9th Street, Suite 1341
Sacramento, CA 95814
Phone: (916) 654-3821
www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor
JOHN MCCAMMAN, Director

April 8, 2010

Janet Laurain
Adams Broadwell Joseph & Cardoza
601 Gateway Blvd., Suite 1000
South San Francisco, California 94080-7037

Re: Public Records Act Requests No. 10-02-036

Dear Ms. Laurain:

This letter is in response to your Public Records Act (PRA) request and receipt of payment for the PRA request numbered above. Thank you for your prompt payment. Enclosed are the documents you requested. Please note there will be two (2) shipments for this PRA request.

If you have any questions regarding this matter, please contact me via email at KVanKeuren@dfg.ca.gov, or contact Steve Ingram or me by telephone at (916) 654-3821.

Sincerely,

Kristine VanKeuren
Administrative Officer

Enclosures

EXHIBIT 345

ATTACHMENT 6

Pete,

Below is an email sent to Tannika yesterday. Because the end of the survey season is this weekend and it's a short week this week, I just wanted to follow up with you in case Tannika is not available. You can reach me at 619-820-0768 if you have any questions.

Thanks!
Shelly Dayman

From: Dayman, Shelly
Sent: Tuesday, May 26, 2009 4:22 PM
To: 'tannika_engelhard@fws.gov'
Cc: Riley, Erin
Subject: Solar Millennium - Desert Tortoise Surveys, Blythe Site

Tannika,

We have been surveying three sites for Solar Millennium this season, one in Ridgecrest and two near Blythe. We have completed one of the sites near Blythe (referred to as the Palen site) and will be completed the Ridgecrest site this week. Recently a land mine was discovered on the Blythe site and so we had to temporarily suspend surveys and are now able to resume surveys. We would like to determine if it would be possible to continue tortoise surveys past the May 31st deadline. Surveys should be completed no later than June 6th.

The predicted temperatures on-site for the next 10 days don't exceed the actual temperatures that have been experienced on-site for the past several weeks and are about 3 to 5 degrees cooler than recent temperatures (the daily high is expected to be between 101 to 104 degrees and temperatures on-site have recently been 107 to 109 degrees). We don't anticipate a difference in ability to observe sign if the surveys are continued until early June.

Please call me at 619-820-0768 if you have an questions.

Shelly Dayman
Biologist
D +1 619.684.6931 C +1 619.820.0768
New email: shelly.dayman@aecom.com

EDAW AECOM
1420 Kettner Boulevard, Suite 500
San Diego CA 92101 USA
T +1 619.233.1454 F +1 619.233.0952
www.edaw.com www.aecom.com

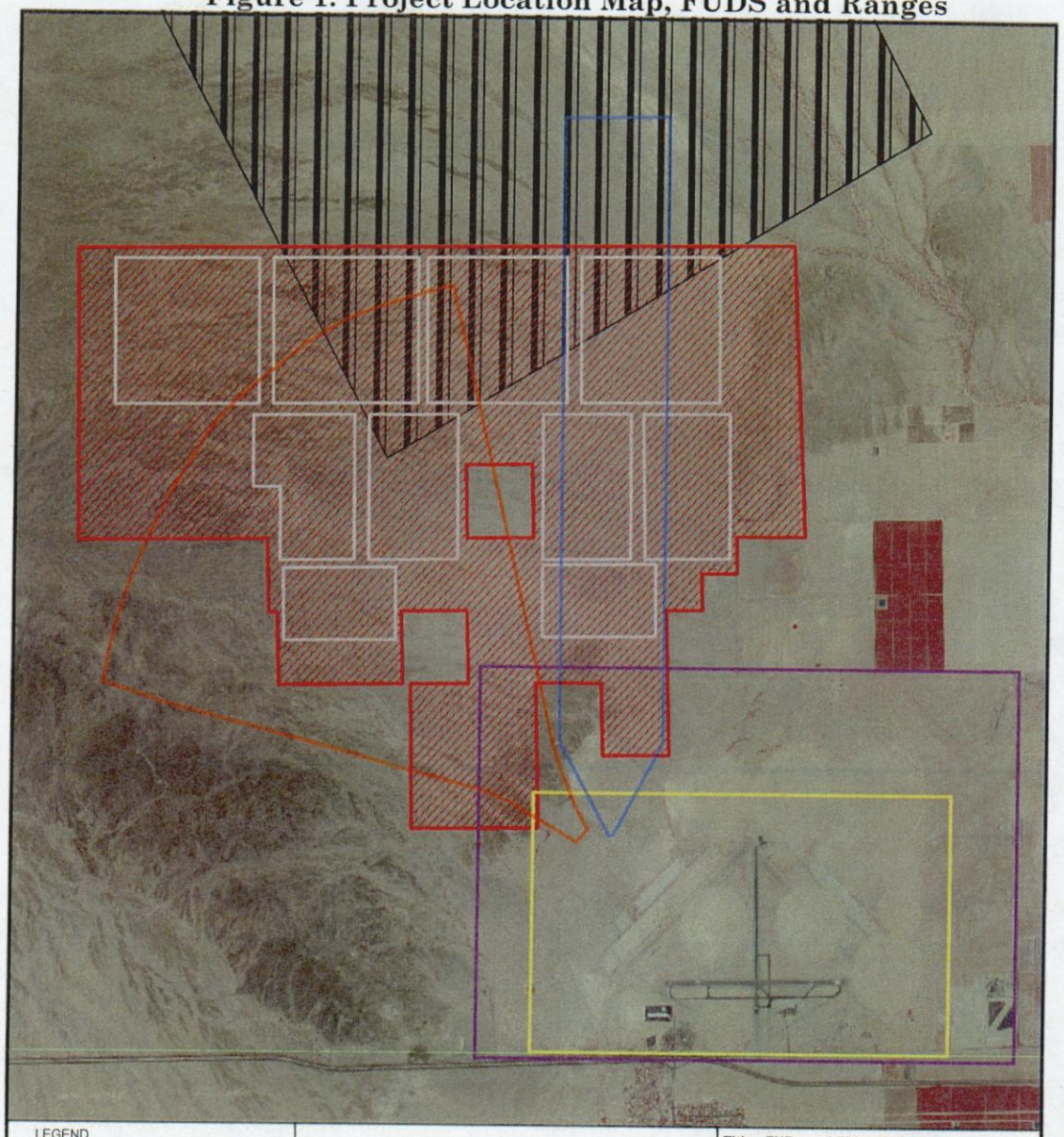
EDAW is evolving.
Beginning October 2009, EDAW will become Design + Planning at AECOM

as we continue to create exemplary environments.
Learn more

EXHIBIT 346

ATTACHMENT 7

Figure 1: Project Location Map, FUDS and Ranges



LEGEND

- Site Location (Based on Source 3)
- FUDs Boundary (Based on Source 2)
- Jeep Range Boundary
- Poorman Range Boundary
- Project Right-of-Way
- Solar Units
- Firing and Bombing Area

0 — 4,000 — 8,000 Feet

N W E S

Title: FUDs and Firing Range and Practice Bombing Range Boundaries

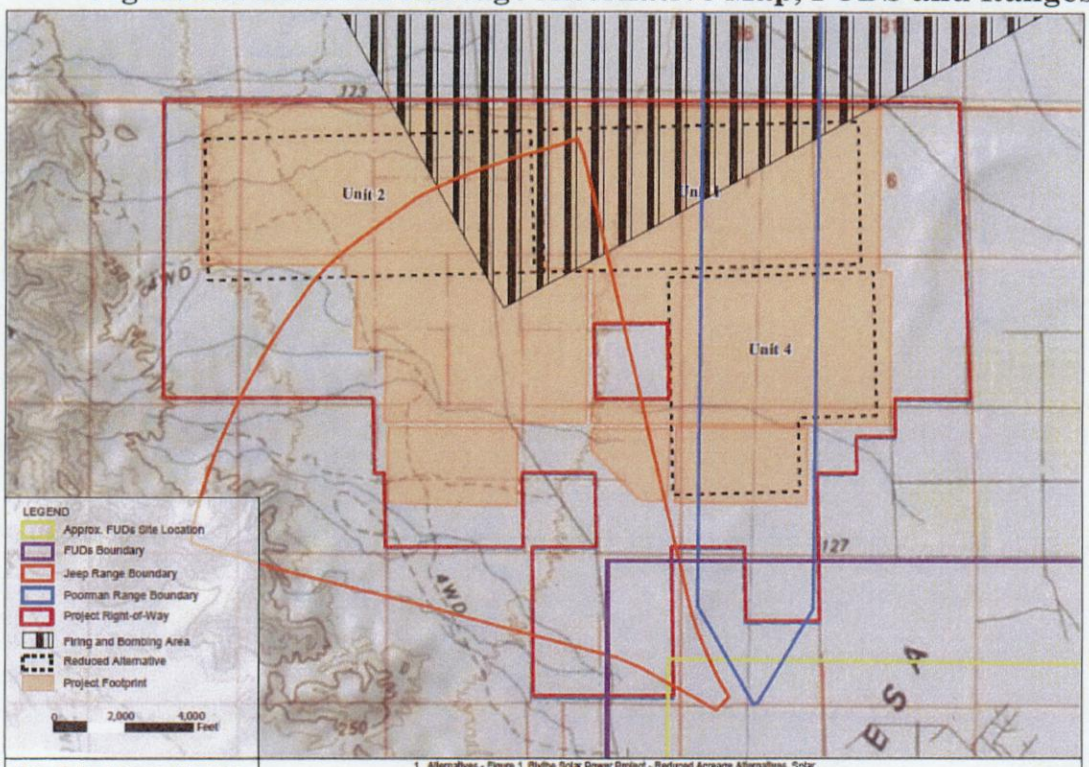
Notes:
1. Hashed area was used During Daylight Hours as a Firing and Bombing Area, Blythe Air Base.
2. FUDs Boundary and Site Location are based on two different sources as noted on the Legend.

Sources used for Figure and Overlay:
1. Blythe Solar Power Project, Figure 2-1, Projection Location Map
2. FUDs & Range Boundaries: Blythe Army Airfield, FUDs Property No. J09CA024500
3. U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, Appendix L-2, pg. 304
4. Defense Environmental Restoration Program Formerly Used Defense Sites Findings and Determination of Eligiblity, Blythe Army Airfield, Blythe California, Site No. J09CA24500, pg. 5

EXHIBIT 347

ATTACHMENT 8

Figure 1a: Reduced Acreage Alternative Map, FUDS and Ranges

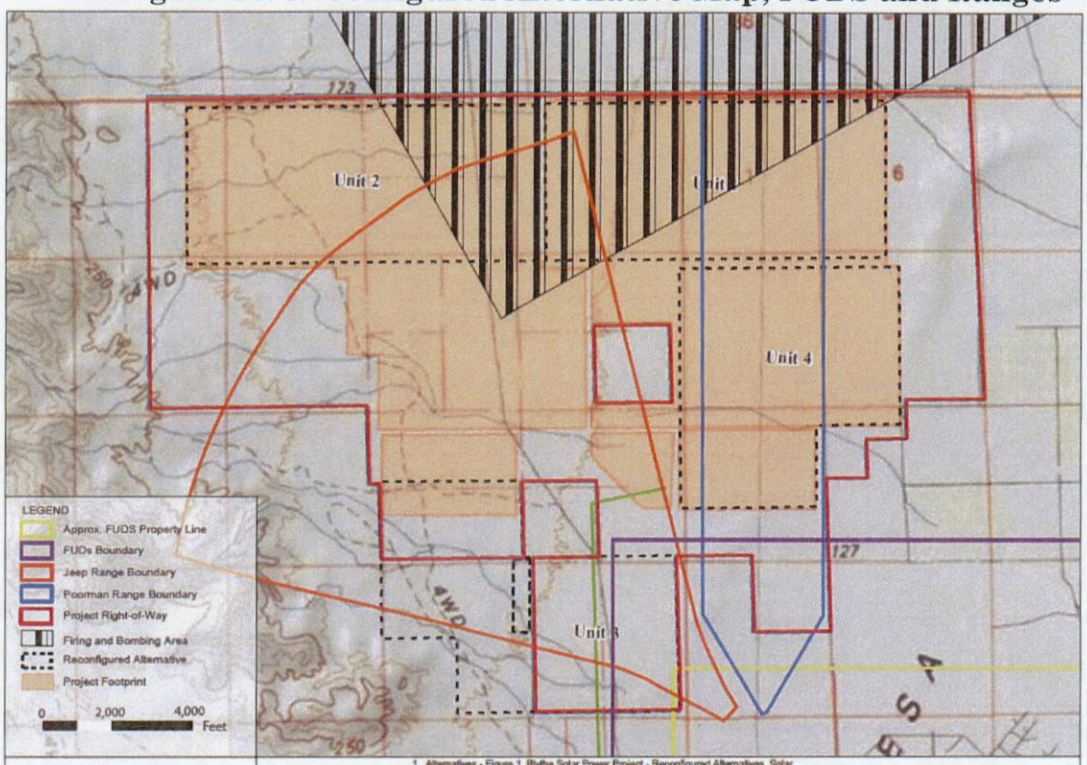


Title: Reduced Acreage Alternative FUDS and Firing Range and Practice Bombing Boundaries	Sources used for overlay: 1. Alternatives - Figure 1, Blythe Solar Power Project - Reduced Acreage Alternatives, Solar Millenium 2009b Figure 2-1, AECOM 2010a 2. FUDs & Range Boundaries: Blythe Army Airfield, FUDs Property No. J09CA024500 3. U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, Appendix L-2, pg. 304 4. Defense Environmental Restoration Program Formerly Used Defense Sites Findings and Determination of Eligibility, Blythe Army Airfield, Blythe California, Site No. J09CA24500, pg. 5

EXHIBIT 348

ATTACHMENT 9

Figure 1b: Reconfigured Alternative Map, FUDS and Ranges



Title: Reconfigured Alternative;

FUDS and Firing Range and Practice Bombing Boundaries

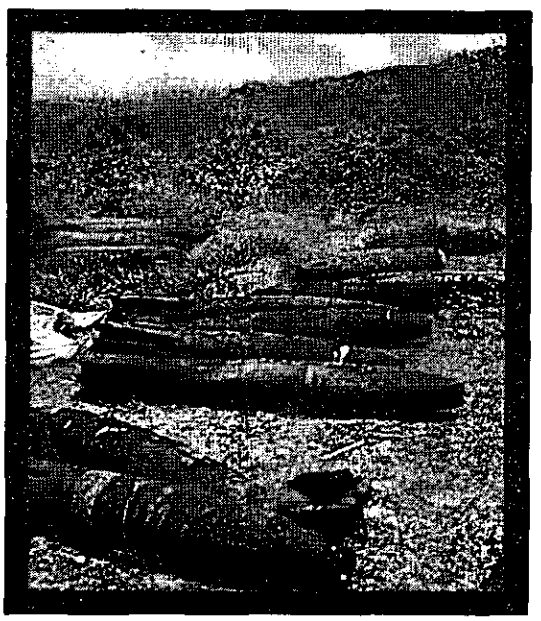
Sources used for overlay:

1. Alternatives - Figure 1, Blythe Solar Power Project - Reconfigured Alternatives, Solar Millenium 2009b Figure 2-1, AECOM 2010a
2. FUDs & Range Boundaries: Blythe Army Airfield, FUDs Property No. J09CA024500
3. U.S. Army Corps of Engineers, Archives Search Report, Former Laguna Maneuver Area, Northern Portion, March 3, 1999, Appendix L-2, pg. 304
4. Defense Environmental Restoration Program Formerly Used Defense Sites Findings and Determination of Eligibility, Blythe Army Airfield, Blythe California, Site No. J09CA024500, pg. 5

EXHIBIT 349

Military Munitions and Explosives of Concern:

A Handbook for Federal Land Managers, with Emphasis on Unexploded Ordnance



February 2006

BLM Handbook [H-1703-2]
FWS Handbook
2006

The U.S. Department of the Interior's Bureau of Land Management and U.S. Fish and Wildlife Service present an overview of unexploded ordnance and its management on Federal lands under their jurisdiction.

We extend our thanks to the Department of the Army and the U.S. Army Corps of Engineers for their assistance with the preparation of this handbook.

Suggested citation:

Bureau of Land Management Protection and Response Group. 2005.
Military Munitions and Explosives of Concern: A Handbook for Federal Land Managers, with Emphasis on Unexploded Ordnance, BLM Handbook H-1703-2. Washington, DC. *. 96 pages.
*Release number 1-1697

Unless noted otherwise, BLM and FWS provided all the photographs.

Cover Photo – Nomans Land Island National Wildlife Refuge, Massachusetts, the results of many years of practice bombing.

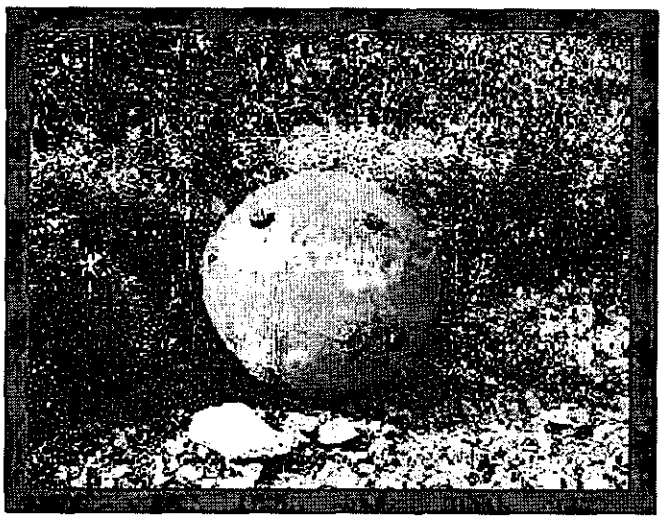
Military Munitions and Explosives of Concern:

A Handbook for Federal Land Managers, with Emphasis on Unexploded Ordnance

BLM Handbook [H-1703-2]
FWS Handbook
2006

Bureau of Land Management
U.S. Fish and Wildlife Service

U.S. Department of the Interior
Washington, DC



Unexploded ordnance comes in all shapes and sizes.
This World War II-era sea mine washed ashore in the Aleutian Islands.
Alaska Maritime National Wildlife Refuge.

How to Get Help if You Encounter Unexploded Ordnance

First: Call local law enforcement or the nearest military installation.
Next: Call the appropriate personnel for your agency:

- **BLM employee**—Call the BLM ranger or call the hazardous materials coordinator at the BLM office, or BLM State office, that has jurisdiction for the site. If you cannot reach the hazardous materials coordinator, call the BLM State law enforcement office emergency number or the BLM national law enforcement office at (208) 387-5126.

- **FWS employee**—Call the regional environmental compliance engineer or regional safety officer.

TABLE OF CONTENTS

FIGURES AND CAPTIONS viii
TABLES ix
PRIMARY DEFINITIONS x
ACRONYMS xii
PREFACE xiv
CHAPTER 1 — INTRODUCTION 1-1
1.1 Background 1-1
1.2 The Need for Safe Management of Transferred DoD Lands 1-2
1.3 Handbook Layout 1-2
CHAPTER 2 — BLM AND FWS PRINCIPLES FOR MANAGING MEC 2-1
2.1 General Statements of BLM and FWS Principles 2-1
2.1.1 BLM 2-1
2.1.2 FWS 2-2
2.1.3 Department of Defense 2-2
2.2 Acquisition of Lands Containing MEC 2-2
2.3 Explosives Safety 2-2
2.4 Inventory of Sites Containing MEC 2-3
2.5 Risk Management 2-3
2.5.1 Responsibility for Risk Assessment 2-3
2.5.2 Risk Management Planning 2-3
2.5.3 Risk Management When Archeological Sites, Traditional Cultural Properties, or Historic Properties Are Present 2-3
2.6 Land Use Plans 2-4
2.7 Munitions Response Actions at Sites Containing MEC 2-4
2.7.1 Responsible Party 2-4
2.7.2 Remedy Selection 2-4
2.7.3 Site Access 2-4
2.7.4 Responses Involving Land Use Controls 2-4
2.7.5 Additional Removal and Remedial Actions at a MEC Site 2-4
2.8 Munitions Response Sites Prioritization Protocol 2-5
CHAPTER 3 — RISK FROM MUNITIONS AND EXPLOSIVES OF CONCERN 3-1
3.1 Potential Munitions on BLM and FWS Sites 3-1
3.2 MEC Risk Factors 3-2
3.2.1 Presence of MEC 3-2
3.2.2 Likelihood of a MEC Encounter 3-3
3.2.3 Likelihood of Detonation 3-8
3.2.4 Consequences of Detonation 3-9
CHAPTER 4 — MEC RISK MANAGEMENT 4-1
4.1 Elements of Risk Management 4-1
4.2 Objective of Risk Management 4-1
4.3 Use of a Conceptual Site Model to Identify and Assess Risk 4-3

4.4 Methods for Eliminating or Minimizing Sources of Risk 4-2
4.4.1 Emergency Munitions Response Action....4-2
4.4.2 Non-emergency Munitions Response Action 4-3
4.5 Methods for Preventing or Minimizing MEC Encounters 4-3
4.5.1 Land Use Controls....4-3
4.5.2 Training and Education to Minimize Inappropriate Actions by Persons Encountering MEC 4-4
4.6 The Special Case of Wildland Firefighting and Rehabilitation of Burn Areas....4-5
CHAPTER 5 — SAFETY AND REPORTING PROCEDURES 5-1
5.1 Safety Issues Related to MEC 5-1
5.2 Safety Guidelines to Follow When Encountering UXO and DMM....5-1
5.3 Process for Reporting MEC and Requesting DoD Support 5-2
5.3.1 Emergency Response Procedures for Reporting UXO or DMM Encounters 5-2
5.3.2 Details to Include in Reports on UXO or DMM Encounters 5-3
5.3.3 Procedures for Requesting an Emergency Response 5-3
5.3.4 Reporting Procedure for Requesting a Non-emergency Response 5-3
5.4 Role of the BLM and FWS Land Manager....5-4
5.5 Information for Visitors and Authorized Users About UXO and DMM 5-5
5.5.1 Hold-Harmless Waiver 5-5
5.5.2 Web Site....5-5
CHAPTER 6 — MEC SITE CHARACTERIZATION AND MUNITIONS RESPONSE OPERATIONS 6-1
6.1 Procedure for Requesting Technical Support from DoD....6-1
6.2 Site Characterization....6-2
6.3 Site Characterization Technologies....6-2
6.3.1 Primary Technologies 6-3
6.3.2 Secondary Technologies 6-4
6.3.3 Technological Advancements 6-6
6.4 Munitions Response Operations 6-6
6.5 Selection of a Response Action....6-7
6.6 MEC Excavation Technologies....6-8
6.6.1 Manual Methods....6-8
6.6.2 Mechanized Systems 6-8
6.6.3 Remote-Controlled Systems....6-8
CHAPTER 7 — MEC-RELATED STATUTES, POLICIES, AND REFERENCES 7-1
7.1 National Environmental Policy Act of 1969 7-1
7.2 Resource Conservation and Recovery Act of 1976....7-1
7.3 Comprehensive Environmental Response, Compensation, and Liability Act....7-2
7.4 Endangered Species Act of 1973....7-2
7.5 Department of the Interior Manual....7-2
7.6 Department of the Army Technical Manual, Ammunition, General 7-2
7.7 Unexploded Ordnance (UXO) Procedures Field Manual 7-2
GLOSSARY....G-1

Appendix 1 — Military Munitions A-1
Appendix 2 — Additional Information A-7
Appendix 3 — Points of Contact (July 2005) A-9
Appendix 4 — Sample Liability Waiver A-11
Appendix 5 — Site Safety and Health Plan A-13

FIGURES AND CAPTIONS

Figure 1 Range residue, including fins from a 60 mm mortar shell, fins from a 3.5-inch rocket-propelled antitank round, and shrapnel....3-3

Figure 2 Illustration of UXO density in a target area on a typical range....3-4

Figure 3 Maps of a multi-range area showing overlapping range fans with a single impact area. In this case, the density pattern is more complicated than Figure 2 as it reflects the flight paths of the rockets and the circle within which all bombs impacted....3-4

Figure 4 Large ordnance can easily penetrate soils....3-5

Figure 5 This 155 mm round is quite noticeable even partially concealed by vegetation....3-5

Figure 6 A way to limit access is to fence areas and post signs....3-7

Figure 7 Land with a flat or rolling topography is much more accessible and more likely to attract visitors than land with mountainous or rugged terrain....3-7

Figure 8 Surface UXO or DMM may be more easily seen on barren desert lands; however, UXO or DMM may also be concealed by the scrub growth and shifting soils....3-8

Figure 9 Not all UXO is on or under the ground. This tank-fired antitank round may be overlooked, although it is a danger and an attractive risk....3-9

Figure 10 Risk Cartoon....4-1

Figure 11 Examples of warning signs. The first two sign are in two languages: English and Spanish....4-4

Figure 12 Example of a double-sided, trifold UXO safety card....4-5

Figure 13 Multisensor Towed Array Detection System (MTADS) configured with cesium vapor magnetometers. Photo courtesy of Blackhawk Geometrics....6-3

Figure 14 Cart system configured with cesium vapor magnetometers. Photo courtesy of Blackhawk Geometrics....6-3

Figure 15 Helicopter configured with magnetometers for UXO and DMM detection. Photo courtesy of Oak Ridge National Laboratory....6-3

Figure 16 MTADS configured with EMI sensors. Photo courtesy of Blackhawk Geometrics...6-4

Figure 17 EMI cart and backpack configuration. Photos courtesy of Blackhawk Geometrics...6-4

Figure 18 EMI skirt configuration. Photo courtesy of Blackhawk Geometrics....6-4

Figure 19 Airborne infrared and ground images of an 81 mm mortar. Photos courtesy of ORD-TECH....6-5

Figure 20 Airborne infrared and ground images of a 25 mm round. Photos courtesy of ORD-TECH....6-5

Figure 21 ORD-TECH's helicopter with an advanced infrared detection system. Photo courtesy of ORD-TECH. 6-5

Figure 22 Ground penetrating radar sled in towed configuration. Photo courtesy of Blackhawk Geometrics. 6-6

Figure 23 Left to right: a 20 mm round (medium caliber) compared with a 20 mm projectile; a .50-caliber round compared with a .50-caliber projectile; and a .50-caliber round compared with a .223-caliber round (used in an M-16 rifle). A-1

Figure 24 Left to right, hand-thrown grenades: a World War II "pineapple" grenade; a fragmentation (practice) grenade, and a canister-style grenade used for smoke and riot-control agents, e.g., tear gas. (Red top indicates a red smoke grenade.) A-2

Figure 25 The projected grenade's small size and appealing shape and color make it most likely to cause death or injury on public lands and refuges. A-2

Figure 26 Milt Williams, public information officer for the Idaho State Department of Lands, looks over some of the artillery shells on an old gunnery range in the Boise Foothills. Wildfire made the surface more visible and led to the discovery of these rounds. Reprinted with persmission of the Idaho Statesman, photograph © Tom Shanahan, September 20, 1996. ..... A-3

Figure 27 81 mm high-explosive mortar. A-3

Figure 28 Rocket, 2.75-inch practice. A-3

Figure 29 Left and center: Practice bomb (BDU-33) and a cutaway of the bomb. This practice bomb is approximately 2 feet long. The central channel in the bomb contains an explosive spotting charge large enough to cause serious injury. (Note: Practice munitions are painted blue, but not all blue munitions are necessarily inert.) Right: Bomb found on public lands north of Chocolate Mountains Gunnery Range, California. A-4

Figure 30 A 155 mm artillery dispenser carries grenade-like submunitions to the target. This dispenser did not open properly to scatter the submunitions; the inert submunitions fell out when the round hit the ground. Submunitions are small and often do not look like military munitions. A-4

Figure 31 Left: Antitank practice mine found on public lands, Chemehuevi Mountains, BLM Needles Field Office, California. Right: Antipersonnel mine. A-5

Figure 32 The numbers in the "window" of this fuze for a 155 mm projectile indicate an internal timing mechanism to allow for an airburst of the projectile. A-5

TABLES

Table 1 Penetration of Bombs and Projectiles into the Earth 3-6

PRIMARY DEFINITIONS

Note: Additional definitions are given in the glossary.

Discarded military munitions (DMM). Military munitions that have been abandoned without proper disposal or have been removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. §2710(e)(2))

Fuzes. Devices that initiate the detonation sequence in munitions. Fuzes are typically associated with munitions (e.g., mortars and bombs), but they are occasionally found separately. They may contain a charge large enough to cause injury. Magnetic and proximity fuzes are the most sensitive and, depending on other factors (e.g., fuze location and arming), greatly influence the likelihood of detonation. When separated from the munitions, a fuze may not look like an explosive munitions item.

The terms *fuse* and *fuze* mean different things. For this handbook, a *fuze* is a mechanical or electrical device with explosive or non-explosive components designed to initiate a train of fire or detonation in ordnance (e.g., hand grenade). A *fuse* is a cord of readily combustible material that can be lit at one end to carry a flame along the length of the fuse to detonate an explosive at the other end (e.g., firecracker).

Military munitions. Ammunition products and components produced for or used by the armed forces for national defense and security. The term *military munitions* includes ammunition products or components under the control of the Department of Defense, the U.S. Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives; pyrotechnics; chemical and riot control agents; smokes and incendiaries; bulk explosives; chemical agents; chemical munitions; rockets; guided and ballistic missiles; bombs; warheads; mortar rounds; artillery ammunition; small arms ammunition; grenades; mines; torpedoes; depth charges; cluster munitions and dispensers; demolition charges; and devices and components thereof.

Military munitions do not include wholly inert items, improvised explosive devices, or nuclear weapons, nuclear devices, or nuclear components. However, military munitions do include non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. §2011 *et seq.*) have been completed. (10 U.S.C. §101(e)(4))

Munitions constituents (MC). Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials. MC also includes emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. §2710(e)(3)) Note: Munitions constituents are MEC when explosive compounds of the munitions, such as TNT, RDX, and HMX, are in sufficient concentration as to pose an explosive hazard. This situation arises when concentration levels are 10 percent or more. Non-explosive munitions constituents and explosive concentrations less than 10 percent are not considered MEC.

Munitions and explosives of concern (MEC). Specific categories of military munitions that may pose unique explosive risks, including:

(a) unexploded ordnance (UXO), as defined in 10 U.S.C. §101(e)(5);
(b) discarded military munitions (DMM), as defined in 10 U.S.C. §2710(e)(2); or
(c) munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. §2710(e)(3), present in high enough concentrations to pose an explosive hazard. (See "Munitions constituents")

Munitions response. Response actions—including investigation, removal actions, and remedial actions—to address the explosives safety, human health, or environmental risks presented by unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC), or to support a determination that no removal or remedial action is required.

Unexploded ordnance (UXO). Military munitions that:

(a) have been primed, fuzed, armed, or otherwise prepared for action;
(b) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and
(c) remain unexploded whether by malfunction, design, or any other cause.
(10 U.S.C. §101(e)(5)(A) through (C))

P.L. 106-65, section 3031 (c)(5)(A), provides a more detailed description.

ACRONYMS

ADNT	Aminodinitrotoluene
AEC	Army Environmental Center
BIP	Blow-in-place
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CB	Citizens band
CCP	Comprehensive conservation plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual site model
CTT	Closed, transferring, and transferred [ranges]
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DMM	Discarded military munitions
DNA	Dinitroaniline
DNB	Dinitrobenzene
DoD	Department of Defense
DOI	Department of the Interior
EM	Engineering Manual
EMI	Electromagnetic induction
EOD	Explosive ordnance disposal
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FACA	Federal Advisory Committee Act
FFCA	Federal Facility Compliance Act
FLPMA	Federal Land Policy and Management Act of 1976
FORSCOM	Forces Command (U.S. Army)
FUDS	Formerly used defense sites
FWS	U.S. Fish and Wildlife Service
GPR	Ground penetrating radar
GPS	Global positioning system
HMX	Her Majesty's explosive [high explosive] and high melting explosive
IR	Infrared
IRP	Installation Restoration Program
ITRC	Interstate Technology and Regulatory Council
JUXOCO	Joint Unexploded Ordnance Coordination Office
MC	Munitions constituents
MEC	Munitions and explosives of concern
MRA	Munitions response area
MRS	Munitions response site
MTADS	Multisensor Towed Array Detection System
NAVFAC	Naval Facilities Engineering Command
NEPA	National Environmental Policy Act

OB/OD	Open burning/open detonation
OE	Ordnance and explosives
OEW	Ordnance and explosives waste
OMB	Office of Management and Budget
PDA	Personal digital assistant
P.L.	Public Law
RAB	Restoration Advisory Board
RAC	Resource Advisory Council
RCRA	Resource Conservation and Recovery Act
RDX	Royal demolition explosive [high explosive]
SAR	Synthetic aperture radar
SARA	Superfund Amendments and Reauthorization Act
TNB	Trinitrobenzene
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
UXO	Unexploded ordnance

PREFACE

Approximately 40 national wildlife refuges managed by the U.S. Fish and Wildlife Service (FWS), and between 200 and 300 formerly used defense sites (FUDS) managed by the Bureau of Land Management (BLM), still have munitions and explosives of concern (MEC) on-site. Therefore, land managers must be prepared for the possibility that personnel, authorized users (i.e., oil gas operator, farmer, rancher, etc.), or visitors will encounter unexploded ordnance (UXO) or discarded military munitions (DMM) on certain public lands and refuges. UXO and DMM encounters that cause injury or death have been rare. However, public use of BLM and FWS lands is increasing, along with the potential for exposure to UXO and DMM. The BLM and FWS developed this handbook to provide managers with important information on what to do when UXO and DMM are encountered and how to minimize the likelihood of an incident leading to injury or death.

The BLM is responsible for managing over 261 million acres of America's public lands and resources for multiple use and sustained yield. As part of this management effort, the BLM accepts into its inventory lands that were formerly used by the military services (Army, Navy, Air Force, and Marine Corps). Accepting lands that have been returned to the public domain and opening former military ranges for public use present unique challenges. More than 5 million acres of BLM-managed land that is open to public access may contain MEC. The BLM is collaborating with the Department of Defense (DoD) and the U.S. Army Corps of Engineers (USACE) to address MEC-contaminated lands currently in BLM's inventory and the possible transfer of additional military lands to BLM management.

The FWS works in partnership with other Federal agencies, State and local governments, tribal governments, international organizations, private organizations, and individuals to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. Under a wide range of Federal laws and executive orders, the FWS has principal responsibility for the protection and conservation of migratory birds, threatened and endangered species, certain marine mammals, and interjurisdictional fisheries. The FWS accomplishes its mission through the management of the National Wildlife Refuge System, Ecological Services Field Stations, National Fish Hatcheries, Wetlands Management Districts with Waterfowl Production Areas, and Coordination Areas, encompassing about 96 million acres in all. The National Wildlife Refuge System includes public lands that were formerly, and in some cases are currently, held and used by the military services. Congress sometimes legislatively directs the BLM and FWS to take lands from the military services. Often these lands contain MEC.

In addition, the FWS manages lands in the Aleutian Islands and the Pacific islands that were battlegrounds during World War II. The islands have MEC remnants from the war.

The BLM and FWS follow several basic principles for managing lands containing MEC, including the following:

- The BLM and FWS have been delegated response authorities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) on lands subject to its jurisdiction, custody, or control (Executive Order 12580).

- The military service is responsible for developing an inventory of the MEC sites on BLM- and FWS-managed lands, with the cooperation of the BLM and FWS. The BLM and FWS will provide the inventory to field offices and field stations, which will be responsible for making the inventories available to local law enforcement and firefighting personnel.
- The responsible military service and the BLM or FWS will jointly implement access controls and other risk reduction actions, as necessary and appropriate.
- The BLM and FWS normally do not accept the transfer of lands until the lands have been properly cleared of MEC to a level that safely supports the intended land use.

Where MEC removal and remedial actions may destroy important habitat, the BLM and FWS may decide to leave some MEC in place and restrict public access to reduce the risk to the public and protect the habitat.

The military service's primary responsibilities include the following:

- Maintain an inventory of sites containing MEC.
- Provide site characterization and risk assessment.
- Assist Federal land managers with risk management.
- Coordinate with the BLM or FWS to obtain the necessary approvals for response actions to ensure that proposed actions are compatible with the agencies' resource management goals.
- Take appropriate removal and remedial actions, with the concurrence of the BLM or FWS.

BLM and FWS managers and personnel do not touch, move, or remove MEC on the Federal lands under their control. The military services retain liability and responsibility for MEC removal and remedial actions on all lands transferred or transferring from the military to the BLM or FWS. Through a partnership with the military services, the BLM and FWS ensure that MEC removal and remedial actions are consistent with the intended land use, protect the environment, and reduce the risk to the public and employees. The BLM and FWS, as land managers, provide oversight for actions performed by the military services.

This handbook will provide Federal land managers and personnel with a fundamental understanding of MEC and of their risk management options for sites with MEC. The handbook presents answers to the following:

- What is MEC and what does MEC look like?
- What should we do if we find MEC?
- What should we tell personnel and the public about MEC?
- What types of sites may contain MEC?
- How do we use a historical records search to learn what types of UXO may be encountered?
- What are the BLM's and FWS's policies and options for managing lands transferred from the military services?
- What technologies are available for detecting and removing UXO and DMM?
- What are the statutes, policies, and references associated with MEC?

Actual injuries and deaths due to contact with UXO and DMM are rare, but the consequences of encountering UXO and DMM are too severe to ignore. Proper UXO and DMM management reduces the

risk to the public and to BLM and FWS employees. It is the responsibility of BLM and FWS managers to educate themselves and their personnel regarding these risk reduction measures.

This handbook does not address commercial explosives.

Chapter 1

Introduction

Acronym List	
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DMM	Discarded military munitions
DoD	Department of Defense
FWS	U.S. Fish and Wildlife Service
MC	Munitions constituents
MEC	Munitions and explosives of concern
UXO	Unexploded ordnance

1.1 BACKGROUND

Since World War II, the military services have returned more than 5 million acres of land used as military ranges to the Bureau of Land Management (BLM). In addition, some U.S. Fish and Wildlife Service (FWS) national wildlife refuges are former military lands or lands that are currently held by the military and are managed by the FWS as overlay refuges. The military used these sites to conduct research and development, testing and evaluation, and training exercises that involved dropping, firing, and placing various ordnance items.

Under the 1988 Base Realignment and Closure (BRAC) Act, subsequent BRAC laws, and other authorities, the military services have transferred or are transferring additional DoD properties to the BLM and FWS. Those lands are both withdrawn public lands and real property that are no longer needed by the military services.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that, before transferring lands from the military, the military service must search for and remove munitions and explosives of concern (MEC) to accommodate reasonably anticipated future land use. These range cleanup operations, especially before 1986, were typically surface removals and frequently did not remove all MEC on and beneath the surface of the land and water. However, in recent years, technological advances in ordnance detection and increasing public interest in environmental issues have prompted more thorough cleanup efforts.

Today, a military service or installation that is transferring its land prepares detailed surveys to identify and quantify MEC that remains on the site. MEC includes unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) when MC is present in high enough concentrations to pose an explosive hazard. The surveys include physical searches, record searches, and interviews with people who worked on the site. Federal, State, and local environmental regulators; citizens; and representatives of land management agencies typically have a role in planning the survey, witnessing the cleanup of identified hazards, and ensuring that risks are reduced to an acceptable level. However, no existing method or combination of methods can ensure 100 percent removal of MEC (see Section 5.1, "Safety Issues Related to MEC"). This handbook refers to the cleanup effort as a *response operation* and the overall

remedial or removal action as a *munitions response*.

1.2 THE NEED FOR SAFE MANAGEMENT OF TRANSFERRED DOD LANDS

Projections for the next decade indicate that the population in the West will increase more than in other regions of the United States. According to the U.S. Census Bureau, Nevada, the State with the highest proportion of Federal lands, has one of the highest rates of population growth, followed closely by Utah and Arizona.

The growing cities of the West have helped create unprecedented demand for outdoor recreation. Although national parks and national forests continue to attract tourists, the BLM's public lands attract a growing number of Americans who seek a more rugged or remote outdoor experience. In 2001, nearly 52 million people visited the public lands for recreation. Specially designated areas, such as wild and scenic rivers, wilderness areas, national monuments, and backcountry byways, are attracting record numbers of visitors. People are also visiting BLM-managed lands to see archeological, paleontological, and historical sites. The increased use of the public lands for recreational purposes, and in particular the use of off-highway vehicles, increases the risk that the public will be exposed to UXO and DMM.

In 2003, nearly 40 million people visited national wildlife refuges across the nation. Many visitors come to the refuges to get closer to the natural world, such as to visit a favorite fishing hole, watch birds at sunrise, or enjoy an environmental education program. Many refuge visitors participate in structured educational programs, but a significant number of visitors are also interested in just "getting away from it all" and exploring areas removed from visitor centers and trails. In the future, as the nation's population grows and urban areas expand, increased demand for outdoor recreation will lead to the need to protect people who are likely to visit Federal lands that are known or likely to contain MEC.

1.3 HANDBOOK LAYOUT

This handbook introduces basic MEC guidance and risk management options for BLM and FWS lands that were formerly, or are currently, used by the military.

Chapter 2, "BLM and FWS Principles for Managing MEC," provides an overview of the agencies' policies and guidance related to MEC on lands managed by those agencies.

Chapter 3, "Risk from Munitions and Explosives of Concern," describes the risk posed by MEC and MEC encounters.

Chapter 4, "MEC Risk Management," considers the risk of exposure to MEC in the context of BLM and FWS land management.

Chapter 5, "Safety and Reporting Procedures," gives an overview of safety guidelines and reporting procedures.

Chapter 6, "MEC Site Characterization and Munitions Response Operations," describes the site characterization process and current technologies available for identification and removal of MEC.

Chapter 7, "MEC-Related Statutes, Policies, and References," gives an overview of the laws and guidelines relating to the management of MEC-contaminated lands.

The **glossary** provides additional definitions of munitions-related concepts and terms.

Appendix 1, "Military Munitions," describes and illustrates the various classes of munitions.

Appendix 2, "Additional Information," lists useful Internet sites with additional information concerning MEC, UXO, DMM, and MC.

Appendix 3, "Points of Contact," lists the departments and officials of the BLM and FWS.

Appendix 4, "Sample Liability Waiver," shows the form given to recreational users at an installation that allows hunting and fishing in an area that may contain MEC.

Appendix 5, "Site Safety and Health Plan," shows the information necessary to minimize potential exposure, accidents, or injuries that could occur.

Chapter 2

BLM and FWS Principles for Managing MEC

Acronym List	
BLM	Bureau of Land Management
CCP	Comprehensive Conservation Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DDESB	Department of Defense Explosives Safety Board
DMM	Discarded military munitions
DOI	Department of the Interior
EOD	Explosive ordnance disposal
EPA	Environmental Protection Agency
FLPMA	Federal Land Policy and Management Act
FUDS	Formerly used defense sites
FWS	U.S. Fish and Wildlife Service
MEC	Munitions and explosives of concern
NEPA	National Environmental Policy Act
OMB	Office of Management and Budget
USACE	U.S. Army Corps of Engineers
UXO	Unexploded ordnance

The Department of the Interior (DOI) addresses the management of munitions and explosives of concern on BLM and FWS sites in its Departmental Manual, Part 602, Chapter 2, "Real Property Pre-Acquisition Environmental Site Assessment" (see Section 2.2 of this handbook). Until specific policy is established, the BLM and FWS are operating under a set of principles for the management of lands containing MEC.

Lands transferred to the BLM or FWS by the military services may contain MEC and may require additional munitions response actions. The ultimate goal of the BLM and FWS is to have unrestricted use of the lands they manage by ensuring the removal of MEC or the remediation of MEC sites by the military services that used the lands. Until that goal is achieved, interim goals should be established that limit risk by considering potential exposure, impacts on the environment, proposed land use, technology limitations, and cost-effectiveness. Current technologies are unable to achieve 100 percent removal of UXO or DMM at a MEC site, refuge, or public lands. Therefore, managers should assume that all MEC sites contain a residual amount of UXO or DMM until proven otherwise.

2.1 GENERAL STATEMENTS OF BLM AND FWS PRINCIPLES

The BLM and FWS, as the Federal agencies responsible for administration of the Federal lands, and DOI, as the department of jurisdiction, work with the military services to limit exposure to MEC for the public and employees. The BLM and FWS have been delegated the CERCLA response authorities on lands subject to its jurisdiction, custody, or control under Executive Order 12580.

2.1.1 BLM

The BLM administers public lands within a framework of numerous laws. The most comprehensive of those laws is the Federal Land Policy and Management Act of 1976 (FLPMA). All BLM policies, procedures, and management actions must be consistent with the act and with other laws that govern the use of public lands.

2.1.2 FWS

The FWS manages the National Wildlife Refuge System under the authority of the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997. The refuge system is managed according to the principles of sound management of fish and wildlife and the administration of fishing, hunting, wildlife observation, and environmental education programs.

2.1.3 Department of Defense

DoD is responsible for the control of military munitions under 10 U.S.C. §172 and responsible for MEC removal or remedial actions under 10 U.S.C. §2701. Therefore, the military retains responsibility and liability for MEC on transferring lands and for MEC that remains on lands already transferred to the BLM or FWS. At sites for which DoD maintains administrative control, it retains complete responsibility related to MEC.

2.2 ACQUISITION OF LANDS CONTAINING MEC

The DOI Departmental Manual, Part 602, Chapter 2, states: "It is the Departmental policy to minimize the potential liability of the Department and its bureaus by acquiring real property that is not contaminated unless directed by the Congress, court mandate, or as determined by the Secretary." The DOI policy requires a bureau that is acquiring real property to ascertain the nature and extent of any potential liability from hazardous substances or other environmental problems, including potential liabilities associated with MEC. The DOI allows bureaus to acquire property with liability only when Congress or the court mandates the acquisition, or when the bureau determines that the acquisition benefits the bureau's programs and when the appropriate authority in the bureau or the Secretary of the Interior approves the acquisition. This latter situation generally is limited to properties for which substantial natural or cultural resource values override the associated environmental liability.

The BLM or FWS will work with the military service responsible for the munitions response actions at a site to balance the need to reduce the risk from MEC with the natural resource values of the site that the agency intends to protect. In some circumstances in which a property has high resource value but is still an active range or otherwise contains MEC, the FWS and the military service can enter into an agreement by which the FWS manages the land as an overlay refuge. In some cases, the FWS might accept the transfer of such properties after military action has ceased and the military service or installation has completed munitions response actions for MEC and other environmental contamination to acceptable levels. The BLM does not have a property management option that is comparable to an overlay refuge.

2.3 EXPLOSIVES SAFETY

The military service is responsible for explosives safety at a MEC site. The regulations and policies of the Department of Defense Explosives Safety Board (DDESB) and military service apply. The BLM and FWS personnel must never ask the military service to disregard explosives safety regulations and policies.

It is the responsibility of the Military Service (not BLM or FWS) land manager to determine if it is likely that a site contains MEC that may pose a hazard to users. Prior to authorizing access to such a site, the land manager should coordinate with DoD and request an analysis of any safety issues that may be associated with access to the site. The preparation by DoD of a safety plan will ensure that such access is accomplished in a manner consistent with DDESB standards. At a minimum the safety plan must state whether visitors entering the site must have an escort who is a specially trained UXO technician.

BLM and FWS employees must report all observed or suspected MEC to appropriate authorities for elimination of the risk. Employees with the potential to encounter MEC must receive safety training so they can (a) recognize potential MEC, (b) identify the location so the UXO or bomb squad personnel can find the UXO or DMM item, (c) safely leave the area, and (d) report the encounter to the proper authorities.

2.4 INVENTORY OF SITES CONTAINING MEC

The U.S. Congress has mandated that the military service is responsible for MEC and for explosives safety and must maintain an inventory of sites containing UXO (P.L. 107-107, section 311). The BLM and FWS will assist the military service with reviewing inventory data for lands they manage.

BLM managers will establish priorities for munitions response actions on their sites that contain MEC. The BLM will provide the prioritized list to the U.S. Army Corps of Engineers (USACE) for its national priorities list of formerly used defense sites (FUDS) response actions.

2.5 RISK MANAGEMENT

2.5.1 Responsibility for Risk Assessment

The military service is responsible for assessing the risk associated with MEC at DoD sites and will provide that information to the BLM or FWS. The BLM or FWS will assist the military with this assessment as it relates to the future intended use of the lands, public visitor use, and employee visits to accomplish the agencies' management objectives. (See USACE Engineer Manual 1110-1-4009, June 23, 2000, Chapter 10, and *Management Guidance for Defense Environment Restoration Program*, September 2001, page 4, paragraph 5.)

2.5.2 Risk Management Planning

As soon as possible after identifying a MEC site, the military service, along with the BLM or FWS, will develop and implement a risk management plan. The plan should protect human health and the environment, including natural and cultural resources. The plan will include a detailed statement concerning the risk at the site, identify institutional and engineering land use controls to be implemented, where appropriate, and establish funding responsibilities for the initial implementation and maintenance of land use controls. The plan should also include a discussion of the long-term management of the land use controls, possible changes in land use, site inspections to ensure that the remedy is working, and the use of new technologies when they become available to reduce or eliminate the need for land use controls.

2.5.3 Risk Management When Archeological Sites, Traditional Cultural Properties, or Historic Properties Are Present

The values associated with archeological sites, traditional cultural properties, and historic properties should be preserved during munitions response actions. The military service should have cultural inventories for sites transferred after 1990 and should be able to provide these reports upon request.

People may be drawn to these sites for ceremonies, curiosity, or other reasons. If the site contains UXO and access cannot be controlled, the munitions response must be adequate to safely accommodate these visits and activities.

During munitions response actions at or near archeological, cultural, or historic properties, measures will be used to minimize the impact on those resources. If there will be unavoidable impacts on the resource, the site will be documented and mitigated by the appropriate specialist prior to the munitions response action, if the documentation and mitigation actions can be conducted safely.

2.6 LAND USE PLANS

Land use plans for lands that include sites containing MEC must address the risk posed by the MEC. The plan will include access closures or restrictions on subsurface activities, if appropriate, and disposal of the lands out of Federal ownership. BLM managers should refer to the *Land Use Planning Handbook* (H-1601-1).

2.7 MUNITIONS RESPONSE ACTIONS AT SITES CONTAINING MEC

2.7.1 Responsible Party

Congress provides the military with funds for munitions response actions at MEC sites. The military retains the liability and responsibility for MEC. If the U.S. Environmental Protection Agency (EPA) or a State regulatory agency directs the BLM or FWS to clean up a site containing MEC, the BLM or FWS will forward that notice to the appropriate military service and advise EPA of the military service's responsibility for the site. The military services have the knowledge, technical expertise, funding, and responsibility to clean up MEC sites.

2.7.2 Remedy Selection

The BLM or FWS is an equal partner with DoD on the munitions response team that selects the cleanup level and methodology. The BLM or FWS manager should be concerned with balancing risk reduction with the safety of visitors, employees, and natural resources. The munitions response plan must protect human health and the environment, including natural and cultural resources.

2.7.3 Site Access

The BLM or FWS will provide DoD, including its contractors, with adequate access to the property containing MEC, as may be reasonably required for DoD to meet its obligations. Before entering the property, DoD will notify the BLM or FWS to allow coordination between response actions and the agency's land management activities. In emergencies, DoD must notify the BLM or FWS as soon as practicable, but no later than 24 hours after entry.

2.7.4 Responses Involving Land Use Controls

The BLM or FWS will coordinate decisions with DoD regarding response actions and land management. Both parties must agree on the remedy selection for any response actions. DoD may act as a cooperating agency for the development of the National Environmental Policy Act (NEPA) documentation for land use planning. Consistent with applicable law, DoD must notify the Office of Management and Budget (OMB) as early as possible about any land use proposal that will affect DoD's budget. This notice may be contained in a refuge comprehensive conservation plan (CCP), any other land use planning process, legislative proposal, or court judgment. To the extent permitted by law, the OMB will review and determine any unresolved budgetary issues between DoD and the BLM or FWS that might result from the land use planning processes or response actions.

2.7.5 Additional Removal and Remedial Actions at a MEC Site

2.7.5.1 Circumstances Under Which BLM or FWS May Request Additional Munitions Response Actions

The BLM or FWS and the military service will jointly decide when the military service will return to a site to conduct additional removal or remedial response actions. BLM and FWS land managers might request the military to return to a site under the following circumstances:

- The initial cleanup level does not adequately protect human health and the environment for the land use.

- EPA or State environmental cleanup standards have become more stringent than those imposed in earlier cleanup actions.
- New technology has become available that would reduce risk and therefore reduce the need for land use controls.
- The land use has changed as a result of events beyond the control of the BLM or FWS and the military service.
- A major natural event, such as a landslide, flood, or wildfire, has exposed MEC that had been buried.

2.7.5.2 Third-Party Use of Federal Lands

Sometimes a third party (e.g., lessee, permit holder, right-of-way grantee) chooses to use lands containing MEC when other options are available. In such cases, the BLM or FWS document authorizing use must include a MEC hazard warning notice and a requirement that the third party complete the MEC removal or remedial action to a level appropriate for the intended use. The third party will bear all costs associated with the additional MEC removal or remedial action and will assume all liability for its actions, including injuries to authorized users of the MEC hazard area.

2.8 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

The DoD published the Munitions Response Site Prioritization Protocol in the Federal Register on October 5, 2005 (70 FR 58016). The purpose of the protocol is to assign each defense site a relative priority for response activities related to MEC based on the overall conditions at the defense site.

The relative priority is based on an analysis of site conditions by a project team, which includes stakeholders, such as the land owner/manager. The BLM or FWS are participating stakeholders for munitions response sites on public lands or refuge lands, respectively.

The site conditions analysis is primarily a hazard/risk analysis which leads to the site being placed in one of eight priority categories or three "Alternative Priorities". "Sequencing" within each of the eight priority categories is influenced by other factors, including proposed land management and land use changes, and other factors which may be known to the land manger, but not specifically addressed in the hazard analysis. It is in the sequencing part of the process where the BLM, FWS, and DOI will have the opportunity to influence timeliness of cleanup of munitions response sites on lands managed by the BLM or FWS.

Chapter 3

Risk from Munitions and Explosives of Concern

Acronym List	
DMM	Discarded military munitions
EOD	Explosive ordnance disposal
HMX	Her Majesty's explosive (high explosive) and high melting explosive
ITRC	Interstate Technology and Regulatory Council
MEC	Munitions and explosives of concern
OB/OD	Open burn/open detonation
RDX	Royal demolition explosive
TNT	Trinitrotoluene
USACE	U.S. Army Corps of Engineers
UXO	Unexploded ordnance

3.1 POTENTIAL MUNITIONS ON BLM AND FWS SITES

A simple definition of risk is "the probability of loss or injury." Risks can be differentiated from hazards by thinking of a hazard as a source of danger, or something that exists, such as MEC on a site, that may bring about risk if encountered. A more complex definition states that risk can be characterized as the probability of a negative event occurring and the severity of the event's effect should it occur. This chapter describes the four factors associated with risk incurred from an encounter with MEC and discusses how to manage those factors.

Munitions and explosives of concern consist of the following categories of military munitions that may pose unique explosive risks:

- Unexploded ordnance (UXO) is the most dangerous category of munitions because it has been readied for use, used, and malfunctioned (i.e., it has not yet functioned as planned). However, the fuze has been activated. Therefore, the explosive condition of munitions that have been readied is unknown. Munitions that have survived an attempt to destroy them by open burning/open detonation (OB/OD) are also considered to be UXO, as the condition of the fuze is unknown.
- Discarded military munitions (DMM) are complete munitions that have not been readied for use and have not been used. They are munitions that were abandoned by troops at a firing range (e.g., buried near the firing line) or tossed aside by maneuvering troops to lighten their load. Given that untrained persons cannot consistently distinguish between DMM and UXO, all BLM and FWS personnel must treat DMM as if it is UXO.
- Munitions constituents are MEC when explosive compounds of the munitions, such as TNT, RDX, and HMX, are in sufficient concentration as to pose an explosive hazard. This situation arises when concentration levels are 10 percent or more. Non-explosive munitions constituents and explosive concentrations less than 10 percent are not considered MEC.

As public use of BLM- and FWS-managed lands increases, more agency personnel will be on those lands. As a result, BLM and FWS managers need to take an active risk management position to ensure the safety of the public and employees. The information in this chapter is provided to increase the managers' understand-

ing of the factors that influence risk associated with MEC on their sites.

3.2 MEC RISK FACTORS

Land managers need to understand risk factors to effectively mitigate MEC hazards on their lands. These factors form a progression of conditions—a chain of events—that lead to a detonation. Eliminating any one step in the chain of events can eliminate the acute consequence of a detonation. Land managers can reduce the risk of exposure posed by MEC by managing all of the following elements of a MEC chain of events:

- Presence of MEC—The determination is made that MEC is present or likely to be found.
- Likelihood of a MEC encounter—The likelihood that a person will have a MEC encounter is based on site accessibility, activity of that individual, and location of the MEC.
- Likelihood of detonation—The likelihood that MEC will detonate as a result of the encounter will depend on the type and condition of the MEC and the type of disturbance.
- Consequences of detonation—The range of possible outcomes or results includes injury or death.

3.2.1 PRESENCE OF MEC

Numerous factors affect whether MEC will be present on public lands and refuges. The primary factor is whether the military used the land for testing, training, or munitions storage or manufacture. Managers should assume that all lands used by the military and its munitions contractors and suppliers contain MEC until proven otherwise. If the lands were never used for testing, training, munitions storage, or munitions manufacturing, the presence of MEC is unlikely. MEC that is found in "clean" portions of an installation generally consists of small items that were perhaps inappropriately removed from training ranges and later hidden or buried to avoid detection.

Transferred lands that were testing and training ranges will probably always have residual surface, and probably subsurface, MEC, even after the military response team conducts response efforts. Also, areas that were used for the manufacture, transport, or storage of munitions may contain authorized munitions burial sites and MEC. Until the mid-1960s, the burial of obsolete, damaged, or otherwise unserviceable munitions was an accepted practice. Most former military lands that were transferred before 1987 were given only a surface clearance. Such "surface sweeps" are generally limited to a visual inspection by military personnel walking the site. Even thorough surface sweeps will not find all the munitions on the surface and will usually not find any subsurface UXO or DMM. If the military response team has conducted a subsurface response, residual UXO and possibly DMM will remain, because the best current technology can find only about 90 percent of subsurface UXO and DMM. Older technologies detected as little as 30 percent. Also, the freeze and thaw cycles of soil moisture, and other soil mechanics, can cause residual UXO and DMM to rise to the soil surface.

To learn about past activity on a transferred site, BLM and FWS personnel can read the military installation's historical records review, also known as the archive search report, which is prepared by the U.S. Army Corps of Engineers (USACE) or the responsible military service. The report gives historical background on MEC and chemical warfare materiel used on a site and is essential for identifying where potential and residual UXO munitions may be located. The Interstate Technology and Regulatory Council's (ITRC) *Munitions Response Historical Records Review* is an excellent source that describes how historical records reviews are prepared by the military and factors that affect their adequacy. The document can be ordered through the ITRC web site at http://www.itrcweb.org.

3.2.2 Likelihood of a MEC Encounter

The likelihood of encountering MEC depends on various factors related to the types and locations of residual MEC at a known or suspected MEC site. An analysis of the potential risk of encountering MEC at a given location should consider the following factors:

- Effectiveness of prior response actions
- Amount of UXO or DMM
- Depth of UXO or DMM
- Size of UXO or DMM
- Shapes of UXO and DMM
- Current and potential land use
- Accessibility of the land
- Topography
- Vegetation and ground cover
- Water cover
- Soil type
- Climate
- Other site features

3.2.2.1 Effectiveness of Prior Response Actions

All MEC sites managed by the BLM and FWS received some level of MEC removal before they were transferred from the military service. The likelihood of encountering MEC is directly related to the effectiveness of prior response actions. It is important for BLM and FWS managers to learn the nature and extent of the response action and, if possible, obtain the associated records from the military, because the residual MEC presents a risk to the public and employees (see ***Figure 1***). Those records include the archive search report or historical records review, which contains the history of the use of the lands, including dates of use of the range, types of activity and munitions used on the range, and types of munitions contained in the storage facility or manufactured on the site.

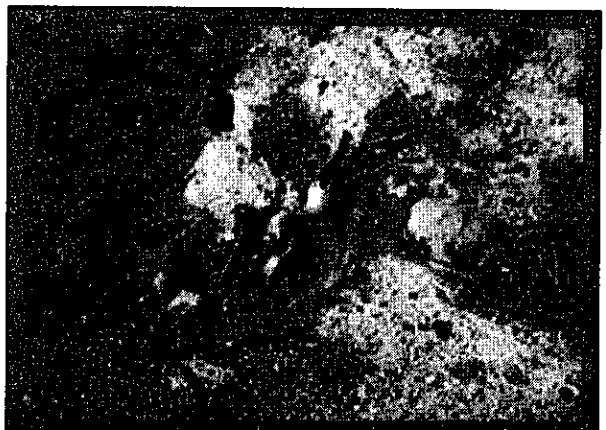


Figure 1 – Range residue, including fins from a 60 mm mortar, fins from a 3.5-inch rocket-propelled antitank round, and shrapnel.

Reports of the removal actions will indicate the level of removal, the technical tools used, and the location and nature of materials found. That documentation also will indicate the effectiveness of the surface removal and the occurrence and depth of any subsurface clearance. It is unlikely that the military did any subsurface clearance before 1986. Documentation of the types and locations of previously detected MEC will be very helpful in determining the types and locations of residual MEC.

3.2.2.2 Amount of UXO or DMM

The likelihood of an encounter increases as the amount of UXO or DMM increases. Although this sounds very basic, it is important to note that the amount of UXO or DMM varies across a military installation and across military ranges. At a military installation, most MEC occurs on former ranges and maneuver areas. However, other sites, including former storage, disposal, or housing areas, may also contain UXO or DMM.

On a typical range, the amount of UXO will be greatest in the target area, in a pattern similar to that shown in ***Figure 2***. The primary impact area of all rounds, and therefore of UXO, is in an elliptical pattern with the target in the center. The long axis is in the direction of fire and results from rounds landing short or long of the target

(firing axis), and the short axis lies to the left and right of the firing axis (deflection axis). Beyond this target area, rounds also could have landed anywhere within the safety fan, with the likelihood of encountering UXO decreasing as the distance from the target area increases. Any area in front of the firing point (down range) could have UXO.

Figure 2 depicts a single firing point, target, and safety fan. Most ranges consist of multiple firing points and multiple ranges. Multiple ranges may be in a line with all weapons firing in the same general direction. If the range area is large enough, the multiple ranges may be located inside a perimeter road with all weapons firing into the center. ***Figure 3*** is a drawing of the overlapping ranges at Siskiyou Rocket and Bombing Range, California. Note that the three safety fans overlap and use the same target. This will affect the density and distribution of UXO.

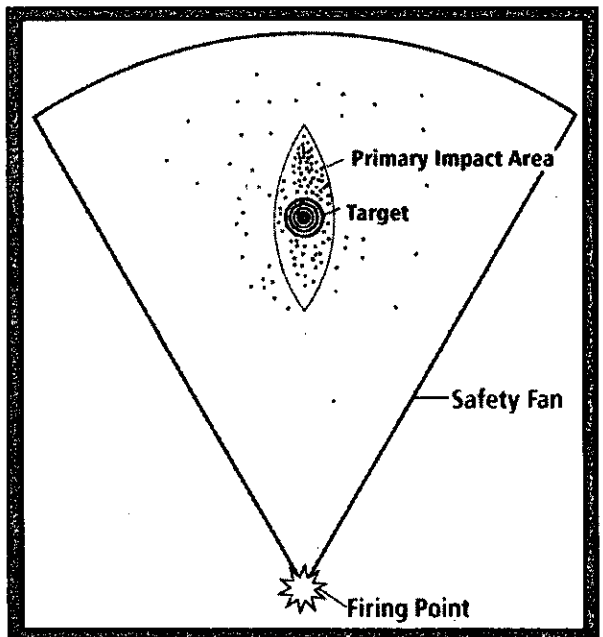


Figure 2 – Illustration of UXO density in a target area on a typical range.

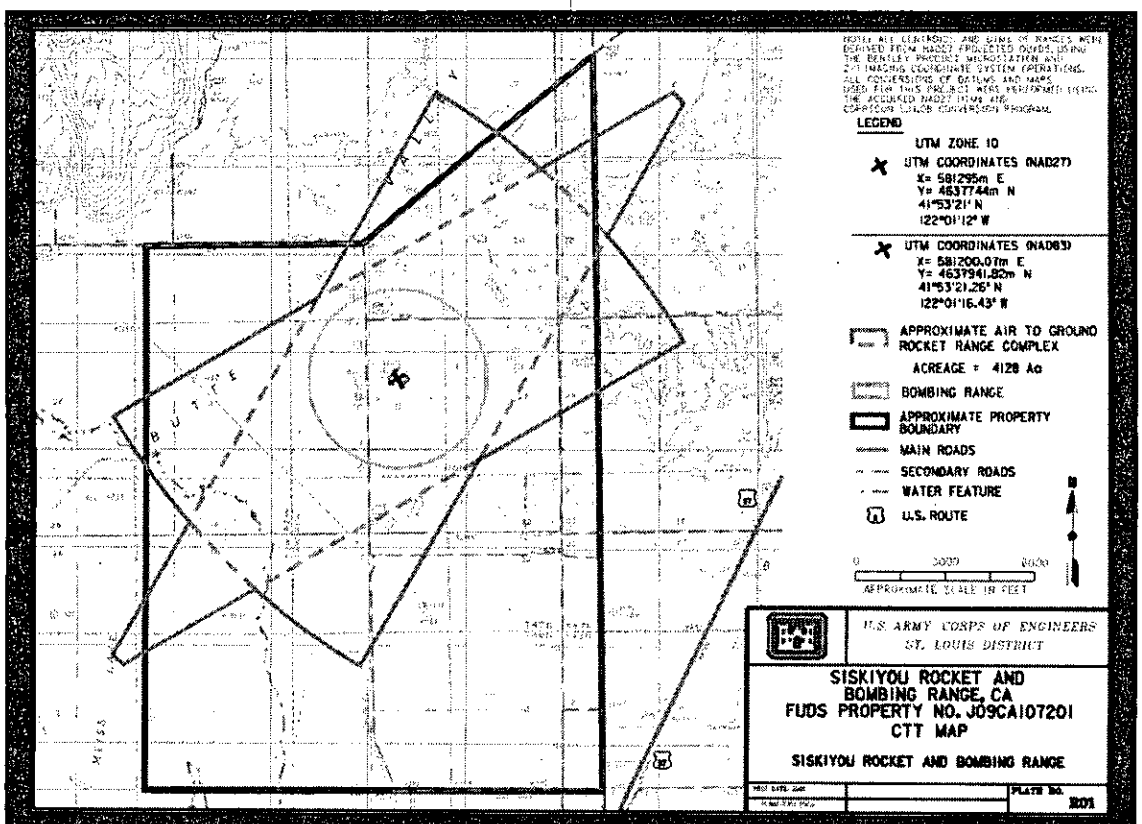


Figure 3 – Maps of a multi-range area showing overlapping range fans with a single impact area. In this case, the density pattern is more complicated than Figure 2 as it reflects the flight paths of the rockets and the circle within which all bombs impacted.

In addition, full rounds of DMM may be buried near a firing point. Until recently, military personnel could not return rounds from an opened case to the ammunition supply point. Although burial was never an approved practice, personnel sometimes buried unused rounds instead of firing the rounds down range. DMM also may be found along "routes of march," at dug-in positions (foxholes), and in bivouac (camping) areas within maneuver areas. Soldiers would lighten their load by tossing rounds aside or leaving rounds behind when they were given the order to move out. A high amount of UXO also is likely to remain in the vicinity of an OB/OD crater. The amount of UXO decreases as the distance from the crater increases.

BLM or FWS managers and personnel should avoid areas that indicate high amounts of UXO; otherwise, they must have a qualified UXO escort when entering areas of suspected or known high amounts of UXO.

3.2.2.3 Depth of UXO or DMM

An encounter is more likely if the MEC is exposed on the surface than if it is buried in the subsurface. On typical Army and Marine Corps ranges, more than 90 percent of UXO and DMM are found within the top 2 feet of soil. Larger, more powerful munitions, such as bombs and artillery projectiles, are heavier than grenades and small arms munitions and therefore are more likely to penetrate the ground to greater depths (see ***Figure 4***). In addition, munitions and projectiles will generally penetrate hard clay soils more deeply than soft soils or sandy soils (see ***Table 1***).

Activities such as walking, driving, digging, trenching, plowing, doing construction, and building campfires may disturb MEC in the subsurface, moving it closer to the surface and thereby increasing the risk of an encounter. Many activities that frequently occur on BLM and FWS lands have the potential to create such a risk, including digging for fence installation,

Figure 4 – *Large ordnance can easily penetrate soils.*

trenching in utility corridors, road building, and maintenance activities.

Weather and climate can also affect the depth of MEC. Over time, buried UXO or DMM may become exposed through weather or wind erosion or may migrate to the surface as a result of the freeze and thaw cycles of soil. Conversely, surface UXO and DMM may become buried by vegetative matter or deposition of wind- or water-borne soil material (see Section 3.2.2.12).

3.2.2.4 Size of UXO or DMM

Large UXO or DMM items on the surface of the ground are more likely to be seen and are therefore easier to avoid than small UXO or DMM (see ***Figure 5***). Easily seen surface UXO or DMM includes large bombs, rockets, and guided

Figure 5 – *This 155 mm round is quite noticeable even partially concealed by vegetation.*

Table 1. Penetration of Bombs and Projectiles into the Earth

Weight of Bomb or Projectile (in pounds)	Depth of Penetration (in feet)*									
	Sandstone		Sand and Gravel		Chalk		Clay		Offset**	
	Avg.	Prob. Max.	Avg.	Prob. Max.	Avg.	Prob. Max.	Avg.	Prob. Max.	Avg.	Prob. Max.
0.25 (20 mm)	0.2	0.5	0.3	0.6	0.3	0.6	0.5	1	–	–
2 (37 mm)	0.3	0.6	0.4	0.8	0.5	0.9	0.8	1.5	–	–
16 (75 mm)	1	2	1	3	2	4	4	6	–	–
30 (105 mm)	2	3	4	6	6	9	10	13	–	–
90 (155 mm)	4	9	8	11	10	13	12	17	–	–
100	8	17	9	19	11	19	14	25	3	18
500	11	23	13	28	16	29	20	35	4	20
1,000	14	29	17	33	20	34	24	43	5	20
2,000	17	34	20	40	24	41	29	52	7	26

*Depth below surface is based on tests designed to maximize the depth of penetration. The depth below surface is provided to show the difference in depths when the same weight bomb or projectile is sent into different soil types. Specific maximum depths of MEC items will be determined site-specifically based on a variety of factors.

**Offset is the distance laterally from the point of entry that a bomb may travel after penetrating the surface of the ground.

Avg. = average

Prob. Max. = probable maximum

– = Not applicable

Source: Range Clearance Technology Assessment (Revision 1), March 1990, Final Report, prepared by Naval Explosive Ordnance Technology Center, Indian Head, MD, pp. 2-14.

missiles. Small arms munitions, grenades, and projected grenades, which are much smaller, are more difficult to avoid. Unfortunately, because of their size, small UXO or DMM items are often picked up and kept as souvenirs.

3.2.2.5 Shapes of UXO and DMM

Many people can readily identify and thus avoid UXO or DMM items that they have seen in movies or on television (e.g., hand grenades and bombs). Nevertheless, some people will pick up such items without thinking. Submunitions, fuzes, and many other small items do not look like military munitions to the untrained eye; therefore, people may be more likely to pick up and examine such items (see Appendix 1). In addition, children may be attracted to smaller munitions because these munitions have enticing shapes and colors.

Another shape-related factor is that munitions may corrode over time and look more like scrap metal (shrapnel) than like a munitions item. Many people assume that old, rusted munitions can no longer be explosive. That assumption can be a fatal mistake.

3.2.2.6 Current and Potential Land Use

Land uses allowed on a MEC site directly affect the exposure of individuals to the MEC hazard. The likelihood that an individual will encounter a MEC item on a munitions response site is directly related to the number of persons who are on the munitions site, the duration of their presence, and their activities during that time. For example, MEC encounters are more likely on lands used for general recreational purposes (e.g., hiking, hunting, off-highway vehicle use, and camping) than on lands used for grazing or in areas without public access simply because

more individuals for a longer period of time have an opportunity to encounter a MEC item.

Any management change in land use that may increase the likelihood that users or personnel will encounter MEC (e.g., from grazing to recreation) requires an understanding of the MEC hazard present. This understanding is developed through review of the work already accomplished by the military at the site, for example a preliminary assessment, site inspection, or other documentation; a hazard assessment or application of other risk methodology; and an understanding of the exposure risk of surface and subsurface intrusive activity. Public use of public lands and refuges where MEC is present should be appropriate to the hazard associated with the MEC and the risk of an encounter. Access controls and education are tools that may be used to reduce the likelihood of a MEC encounter.

When considering land use at or near MEC sites, the adjacent land uses which might bring people within the maximum horizontal fragmentation distance of an explosive event at the site should also be considered. The military service responsible for the site can provide that information.

Before approving intrusive activity into the subsurface where MEC may be located (e.g., installing fences, building roads, or excavating a foundation), the land manager should request the appropriate military service to provide MEC avoidance or construction support so MEC in the subsurface may be avoided or remediated prior to the intrusive activity (see Sections 6.1 and 6.2).

3.2.2.7 Accessibility of the Land

An area's accessibility contributes to the number of people likely to go on the land and encounter MEC (see ***Figure 6***). An unfenced area near a road is more accessible than a remote fenced area. In addition, the use of off-highway vehicles, such as all-terrain vehicles, has made some rugged, remote areas more accessible.

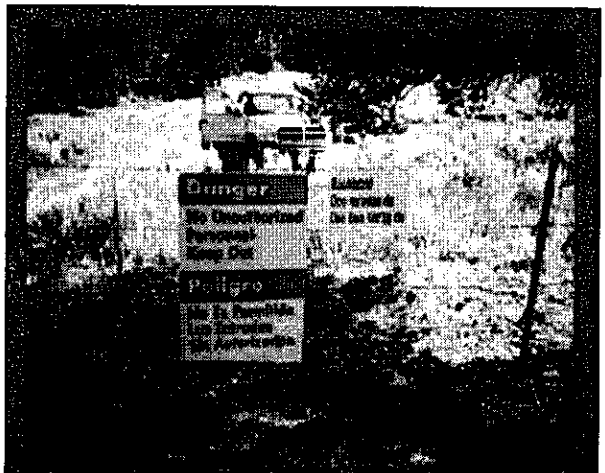


Figure 6 *– A way to limit access is to fence areas and post sign.*

Land managers may need to increase the number of warning signs, install fences, or use other access restrictions, and enforce those restrictions, in areas of concern.

3.2.2.8 Topography

Topography can influence the number of people likely to enter a site, the amount and type of MEC found, and potential land use (see ***Figure 7***). In general, the public is more likely to enter flat land near populated areas than remote land with rugged terrain. Topography also influences where MEC may be concentrated. MEC is more likely to migrate to valleys and depressions

Figure 7 *– Land with a flat or rolling topography is much more accessible and more likely to attract visitors than land with mountainous or rugged terrain.*

through surface water movement, soil erosion, landslides, and avalanches.

3.2.2.9 Vegetation and Ground Cover

Surface MEC may be seen more easily on barren desert lands (see ***Figure 8***). Conversely, heavy vegetation and ground cover may conceal even large MEC items. However, heavy vegetation and ground cover can limit access to an area, thus reducing potential encounters with MEC.

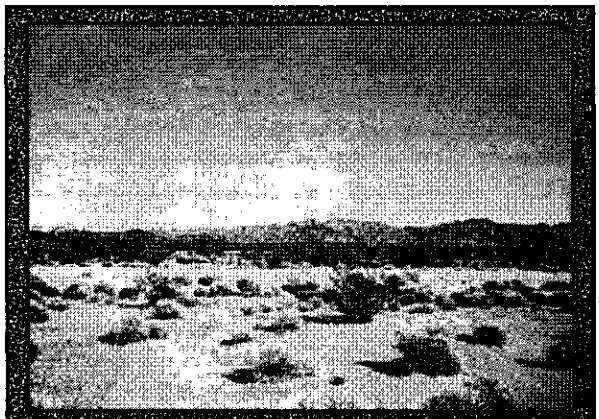


Figure 8 — *Surface UXO or DMM may be more easily seen on barren desert lands; however, UXO or DMM may also be concealed by the scrub growth and shifting soils.*

3.2.2.10 Water Cover

MEC can also be found in groundwater, surface water, and marine environments. Water may increase or limit visibility, depending on the water's depth and turbidity. Water may restrict access to UXO and DMM. Some activities, such as dropping an anchor, could lead to MEC encounters.

3.2.2.11 Soil Type

Soil type influences the depth to which munitions penetrate the ground and can affect whether the fuze activates. Some fuze types require a substantial impact before they will activate. If the munitions item lands in mud or fine soil, the fuze may not activate as designed. With such site conditions, the likelihood and amount of UXO increases. In addition, munitions penetrate hard clay soils deeper than soft soils.

3.2.2.12 Climate

Climate affects the surface and subsurface movement of UXO and DMM in several ways. Heavy rainfall and high winds cause surface water movement and soil erosion, thus causing UXO and DMM to migrate. The depth of the frost line and the frequency of the freeze/thaw cycle in different climates also affect the movement of UXO and DMM to the surface. Generally, colder climates have deeper frost lines, thus contributing to a greater number of UXO and DMM items migrating to the surface. Colder climates with more snow cover also may conceal surface UXO and DMM.

3.2.2.13 Other Site Features

Impact craters indicate a high potential for UXO. Jagged pieces of metal, mortar fins, and other debris from munitions that functioned properly are good indicators that numerous large UXO may also be present. BLM and FWS managers should ensure that personnel and visitors are not permitted to enter these areas without an EOD escort. All persons entering these areas must use extreme caution.

3.2.3 Likelihood of Detonation

The likelihood of a MEC encounter that leads to an accidental detonation depends on three primary factors: (a) the actions of the individual encountering the UXO or DMM, (b) the location of the MEC, and (c) the condition of the UXO or DMM.

Following the safety guidelines presented in Chapter 5 will greatly reduce the likelihood of detonation:

- Do not move any closer to the UXO or DMM after observing it.

- Do not touch, move, disturb, or attempt to pick up the UXO or DMM.
- Do not attempt to mark or remove an object on, attached to, or near the UXO or DMM.
- When reporting the UXO or DMM, do not use any electronic communication devices, such as cell phones, near the UXO or DMM.

The location of the UXO or DMM (i.e., surface, subsurface, or partially buried) also affects the likelihood of detonation (see ***Figure 9***). Subsurface UXO or DMM is less likely to be disturbed by someone walking or driving over it than UXO or DMM that is lying on the surface. The risk of encountering UXO or DMM decreases as the depth of the UXO or DMM increases. Partially buried UXO or DMM is most susceptible to being disturbed by someone tripping over it or kicking it or by a vehicle driving over it and radically changing its position. An item on the surface is most easily seen and avoided.

The condition of the UXO, especially the fuze, is a critical variable in the likelihood of an unintentional detonation. When the fuze of a UXO has been armed, but has not functioned as intended, the damaged fuze may be further sensitized. Even professional EOD personnel cannot determine with certainty the condition of the fuze. For those reasons, anyone encountering munitions on a site should never approach, touch, or otherwise disturb it, because it could be UXO.

Figure 9 – Not all UXO is on or under the ground. This tank-fired antitank round may be overlooked, although it is a danger and an attractive risk.

3.2.4 Consequences of Detonation

The BLM's and FWS's goal is to avoid the accidental detonation of MEC. The consequences of detonation can range from limited injuries (e.g., loss of fingers or a hand caused by a spotting charge in practice munitions) to massive injury or loss of life. In any case, detonations are instantaneous. Although in most cases the risk from MEC cannot be completely eliminated, reducing the risk is essential to the safe reuse of former ranges as public lands and refuges.

Chapter 4

MEC Risk Management

Acronym List	
AEC	Army Environmental Center
CSM	Conceptual site model
CTT	Closed, transferring, and transferred
DMM	Discarded military munitions
DoD	Department of Defense
EM	Engineering Manual
EOD	Explosive ordnance disposal
EPA	Environmental Protection Agency
FACA	Federal Advisory Committee Act
ITRC	Interstate Technology and Regulatory Council
MEC	Munitions and explosives of concern
NAVFAC	Naval Facilities Engineering Command
OB/OD	Open burning/open detonation
RAB	Restoration Advisory Board
RAC	Resource Advisory Council
USACE	U.S. Army Corps of Engineers
UXO	Unexploded ordnance

4.1 ELEMENTS OF RISK MANAGEMENT

This section provides information to help BLM and FWS land managers apply risk management practices to MEC-contaminated lands. Managers should use professional risk managers to develop a risk management plan for the MEC site.

Risk management on Federal lands will involve the following three phases (see ***Figure 10***):

- **Risk perception** — Perception of risk, that is, awareness of a hazard that has an associated risk, may come from land use inventories performed by the military services, BLM, or FWS; from MEC site inventories; or from reports by the public or employees who encounter MEC. Once it is known that MEC may be present and pose a risk to the public and employees, the next step is to determine the magnitude and extent of the problem.
- **Risk assessment** — The second phase involves the analysis of the risk factors discussed in Section 3.2. This analysis provides information on the MEC hazard, its location, the amount or degree of risk, and the consequences of an encounter with the hazard.
- **Risk management** — The third phase involves developing a risk management plan and managing the site to reduce or eliminate an encounter with the hazard.

4.2 OBJECTIVE OF RISK MANAGEMENT

The objective of risk management is to reduce or eliminate the opportunity for an encounter with

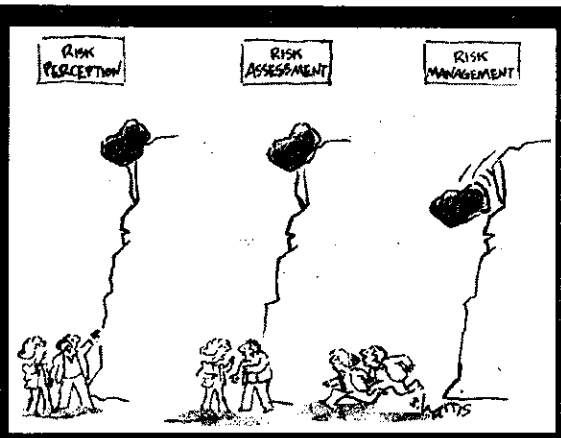


Figure 10 - Risk Cartoon

the hazard. That is done by analyzing the risk at each step of the potential chain of events, as shown in Section 3.2, and by either breaking the chain of events or reducing the likelihood of an event occurring. The following steps are involved in managing risk:

- Manage the source of the risk (the presence of MEC)
- Manage the likelihood of an encounter
- Educate people to recognize and avoid MEC

Although the likelihood of detonation and consequences of detonation are beyond a land manager's control, eliminating or reducing the likelihood of an encounter through management actions reduces the risk of detonation.

4.3 USE OF A CONCEPTUAL SITE MODEL TO IDENTIFY AND ASSESS RISK

The conceptual site model (CSM) is a description of a site and its environment that is based on existing knowledge and is updated regularly. It describes sources of MEC at a site; actual, potentially complete, or incomplete exposure pathways; current or reasonably anticipated future land use; and potential receptors. The source-receptor interaction is one descriptive output of a CSM. The CSM serves as a planning instrument, a modeling and data interpretation aid, and a communication device among the response team members.

4.4 METHODS FOR ELIMINATING OR MINIMIZING SOURCES OF RISK

Section 3.2.1 outlines the factors affecting the presence of MEC on lands used for military training and testing or for manufacturing and storing munitions. The BLM and FWS manage the source of the risk by working with the military services to have MEC eliminated from the site. If all MEC is eliminated from the site, the potential chain of events is broken, and the risk management action can stop.

Currently, eliminating 100 percent of MEC from a site is generally not technically feasible, unless the soils are excavated and sifted. Therefore, MEC sites will almost always have a residual risk that must be managed. The land manager's objective is to work with the responsible military service to determine a balance among residual risk, the proposed land uses, environmental damage caused by the munitions response action, and cost. The management goal is to reduce the amount of residual MEC to a level appropriate for the proposed land uses, without destroying important habitats. This is not an easy balancing act, given limited funding, and should involve input from the BLM's public Resource Advisory Council (RAC) or the military installation's Restoration Advisory Board (RAB), or some other public input. Although the FWS does not have a RAC, the FWS manager should assign an interdisciplinary team composed of refuge personnel, biologists, real estate specialists, outdoor recreation specialists, environmental engineers, and environmental contaminants specialists to work with the military service. (Note: The BLM RAC is a Federal Advisory Committee Act [FACA] group. It is a public body and is not the same as the FWS interdisciplinary internal team.)

Personnel could encounter MEC on almost any former military installation. For example, controlled burns or wildland fires can expose previously hidden UXO or DMM, soil erosion from heavy precipitation or high winds can uncover subsurface UXO or DMM, and normal freeze/thaw cycles can cause munitions to migrate to the surface. When significant land-altering events occur on previous munitions response areas, BLM or FWS managers should request the military service to return to the site to do a surface survey for newly exposed MEC.

4.4.1 Emergency Munitions Response Action

Whenever a discrete UXO or DMM item is discovered on a site, BLM and FWS managers must contact explosive ordnance disposal (EOD)

or bomb squad personnel to have them immediately remove the item from the site. This type of removal action is referred to as an *emergency munitions response* action because it expeditiously addresses a known, specific, exposed UXO or DMM hazard.

The likelihood of additional persons encountering the UXO or DMM decreases as the thoroughness of the munitions response action increases. The EOD team or bomb squad conducting the emergency removal should also check the immediate vicinity for other UXO or DMM. The local BLM or FWS office should retain a copy of the EOD or bomb squad report and periodically review reports to determine if the reports reflect any pattern indicating that a specific area warrants further investigation.

4.4.2 Non-emergency Munitions Response Action

A non-emergency munitions response action is generally long term. The BLM or FWS land manager should request a non-emergency munitions response action when (a) MEC are known or suspected in an area, but the nature and extent of the contamination have not yet been defined, or (b) multiple emergency munitions response actions have been required at the same location, indicating a concentration of UXO or DMM items near the surface that are becoming exposed. In such cases, an appropriate risk reduction measure would be a subsurface non-emergency munitions response action to remove the UXO or DMM before it becomes exposed. This non-emergency munitions response action would reduce the frequency of emergency munitions response actions by EOD teams and would eliminate the possibility that the UXO or DMM would later be exposed and result in a public encounter.

4.5 METHODS FOR PREVENTING OR MINIMIZING MEC ENCOUNTERS

In addition to using emergency and non-emergency response actions to minimize the MEC at a site, the BLM and FWS land managers must evaluate ways to minimize encounters by the public or agency personnel with any remaining MEC. If there is no encounter, there will be no risk from a detonation.

4.5.1 Land Use Controls

BLM and FWS managers can minimize unintended encounters with MEC by implementing land use controls (where appropriate), which consist of institutional controls and engineering controls. In certain situations the military may maintain administrative control of parcels of land within properties controlled by the BLM or FWS. In these situations the military will be responsible for implementing and maintaining the appropriate land use controls.

4.5.1.1 Institutional Controls

Institutional controls are the legal and administrative tools that ensure that the continuing and future use of the site is compatible with any residual MEC contamination. For the BLM and FWS such tools normally include: governmental controls (e.g., permits), access restrictions established through resource and refuge management plans, and informational tools (e.g., signs). The following are examples of ways that managers can establish institutional controls:

- BLM and FWS land managers can transcribe information indicating locations of hazardous areas to master title plats (BLM) and land records (FWS).
- BLM resource management plans and FWS refuge management plans should consider MEC hazards when analyzing access, land use, and information (educational) requirements.
- The BLM may close the area to incompatible activities by withdrawing from operation of some or all of the public land laws (e.g., withdrawal and reservation for public safety).
- The FWS may limit public access to part of a refuge.

All refuge and public lands personnel must have access to hazard information in order to support management decisions that minimize encounters with MEC. The BLM plats and FWS records should provide a source of information that agency personnel can check before doing field-work to ensure that the proposed work area contains no hazards. Also, agency personnel can check the records for hazards so that future authorized land use activities remain compatible with land use restrictions that have been imposed because of the residual risk from MEC.

4.5.1.2 Engineering Controls

Engineering controls are used to limit access to MEC sites by posting a warning, such as signage, or by erecting a physical barrier, such as fencing. If signage is used, signs must be posted in the languages used most commonly in the area, such as English and Spanish, but may also include local Native American languages (see ***Figure 11***). Fencing must convey the message, along with signage, that an area is off limits to the public. In some cases barbed wire will be sufficient; in other areas chain-link fencing may be required. Other less frequently used measures include closing roads to make reaching an area more difficult, or capping burial sites or open burning/open detonation (OB/OD) areas.

Engineering controls require maintenance; therefore, either the military service or the BLM or FWS must provide funding to maintain the engineering controls. This responsibility is often shared. Details of the relationship are described in a memorandum of agreement.

4.5.2 Training and Education to Minimize Inappropriate Actions by Persons Encountering MEC

BLM and FWS personnel and the public have encountered and will continue to encounter MEC on lands transferred from the military services. How they react to an encounter is determined in part by the safety training they have received. The land manager is responsible for ensuring that safety training is provided to all personnel who may be working in or transiting potential MEC hazard areas. The amount and types of training needed depend on the duties of the individual.

Training is available through the following entities:

- **DoD** — Web site at http://www.denix.osd.mil/denix/Public/Library/Explosives/UXOSafety/uxosafety.html
- **Interstate Technology and Regulatory Council (ITRC)** — UXO Basic Training at http://www.itrcweb.org
- **EPA** — Planning and Management of Munitions Response Actions
- **BLM and FWS** — This handbook and other printed sources

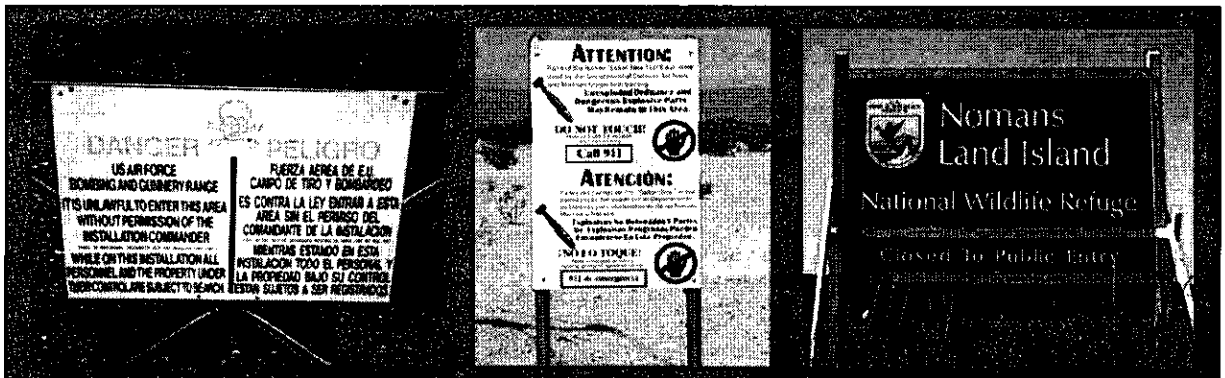


Figure 11 – Examples of warning signs. The first two signs are in two languages: English and Spanish.

The USACE and Naval Facilities Engineering Command (NAVFAC) also have more advanced courses available for employees working on munitions response project teams. Those agencies also can help with the design of signage and may be able to provide it.

Managers of sites with MEC-contaminated lands that are open to public access and use should show a short safety video and provide safety cards similar to the one shown in ***Figure 12***. Safety videos are available from USACE and the Army Environmental Center (AEC). The BLM is developing a short safety video for its public lands. Appendix 2 provides a list of sources for safety information and videos.

The basic training for the public and employees should be simple, such as repetition of slogans and some basic recognition factors. Slogans such as the following are very effective in MEC areas: "Remember the three R's of UXO – Recognize, Retreat, and Report," and "If You Did not Drop It, Do not Pick It Up."

Safety training must include a discussion of the likelihood and consequences of a detonation. If a person is behaving in an unsafe manner, such as carrying a MEC item they have picked up, it is too late to do anything other than clear the area and request the person to stop the inappropriate behavior. After securing the area, call the EOD unit or bomb squad to assess the situation.

4.6 THE SPECIAL CASE OF WILDLAND FIREFIGHTING AND REHABILITATION OF BURN AREAS

Wildfires may be hot enough to cause munitions to detonate. Wildfires will also expose munitions on the surface. Wildland firefighting and fire rehabilitation activities penetrate the ground surface and expose firefighters and equipment operators to significant risk.

Land use plans and fire management plans should note areas of potential MEC so that managers do not send BLM and FWS personnel into such areas to fight fires. Heat from the fire and impact from equipment could detonate explosives, thereby making the fighting of fires in such areas too risky.

Land managers should also avoid fire rehabilitation in areas with potential MEC, or they should file a request with DoD for assistance from properly trained EOD personnel. Trained personnel will investigate areas where ground-disturbing activity may take place. They also will locate and mark potential MEC and the hazard area ingress and egress routes. BLM and FWS rehabilitation personnel must avoid marked locations, unless properly trained EOD or UXO personnel have removed the MEC.

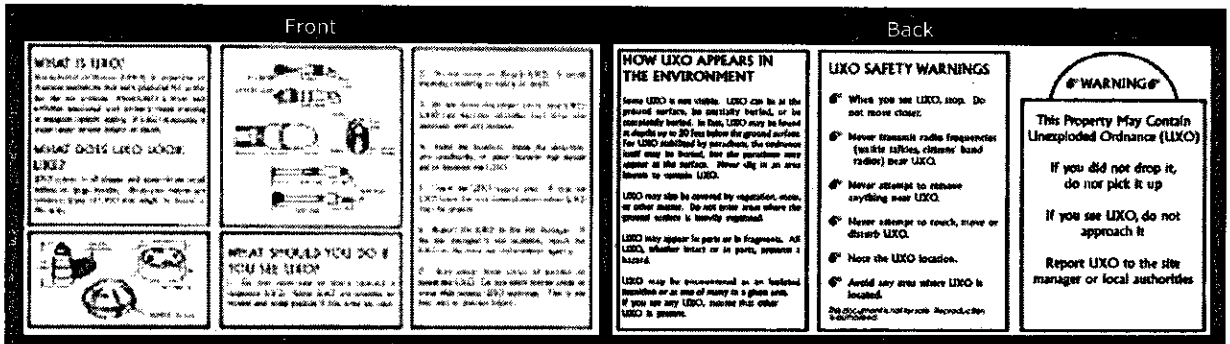


Figure 12 – Example of a double-sided, trifold UXO safety card.

Chapter 5

Safety and Reporting Procedures

Acronym	List
AEC	Army Environmental Center
BRAC	Base Realignment and Closure
CB	Citizens band
DMM	Discarded military munitions
DoD	Department of Defense
EOD	Explosive ordnance disposal
FORSCOM	U.S. Army Forces Command
FUDS	Formerly used defense site
GPS	Global positioning system
IRP	Installation Restoration Program
MEC	Munitions and explosives of concern
NAVFAC	Naval Facilities Engineering Command
PDA	Personal digital assistant
USACE	U.S. Army Corps of Engineers
UXO	Unexploded ordnance

This chapter provides a summary of safety guidelines and reporting procedures that are essential to the proper management of MEC and lands that contain MEC.

5.1 SAFETY ISSUES RELATED TO MEC

Although the military services retain liability for MEC cleanup, DoD munitions response operations typically cannot remove every item of MEC given the current technological limitations. BLM and FWS personnel should assume that residual munitions remain on-site after a response operation is completed. All lands known to contain or suspected of containing MEC, including lands where a removal action has been completed, must be managed as if the risk of encountering MEC will continue. Residual UXO and DMM may migrate to the surface long after response operations are completed; thus, land managers must plan for long-term risk management at all MEC sites.

All site personnel must treat any UXO and DMM they encounter, including practice ordnance, with great caution. Practice ordnance can contain a spotting charge that could cause injury or death.

5.2 SAFETY GUIDELINES TO FOLLOW WHEN ENCOUNTERING UXO AND DMM

The first and most important rule of UXO and DMM safety is to remember:

If you did not drop it, DO NOT pick it up!

Second, memorize the three R's of UXO and DMM:

Recognize, Retreat, and Report.

Other important considerations include the following:

- Treat all MEC found on a site as UXO, the most hazardous of the MEC categories. Only qualified EOD personnel can tell the difference between UXO and DMM.
- Do not move any closer to a MEC item after recognizing it as potential UXO or DMM. Some types of ordnance have magnetic, or motion-sensitive, proximity fuzes that may detonate when a target is sensed. Others have built-in self-destruct timers. Even casting a shadow on a certain type of fuze (piezoelectric) may cause an abrupt change in temperature that is sufficient to cause a detonation. In

most cases, if you can see a UXO or DMM item, you are already within its kill radius.

- Do not move or disturb UXO or DMM, because the motion could activate the fuze, causing the munition to explode. If the fuze has malfunctioned, there is no way to know its condition, and any movement could cause it to function. Also, some munitions have antidisturbance fuzing.
- Do not attempt to remove any object on, attached to, or near UXO or DMM. Some fuzes are motion-sensitive or might have trip wires that could cause the UXO or DMM to explode.
- Do not mark the location of a UXO or DMM in a way that would attract the attention of someone just passing by.
- Document and unobtrusively mark the location of a UXO or DMM item to help ordnance experts locate the item.
- Leave the UXO or DMM hazard area.
- Restrict visitor access.
- Report the UXO or DMM to the appropriate authority (see Section 5.3).
- Do not transmit from walkie-talkies, shortwave radios, citizens band (CB) radios, cellular telephones, wireless PDAs (personal digital assistants) that transmit to the Internet, or other communication and navigation devices. The transmission signal may detonate the munition. You *can* use a global positioning system (GPS) receiver because it is a receive-only device.

The best way to prevent an encounter with UXO or DMM is to stay away from areas known to contain or suspected of containing MEC. However, if you must enter an area with known or suspected UXO or DMM, request a military EOD specialist escort. And remember:

All UXO or suspected UXO is fuzed, armed, and extremely dangerous!

5.3 PROCESS FOR REPORTING MEC AND REQUESTING DOD SUPPORT

The two types of requests for military service support are the emergency response request and the non-emergency response request. A munitions emergency occurs when a known, observed munition is discovered on a site and presents a hazard that must be dealt with immediately to prevent a MEC encounter. A non-emergency situation occurs when munitions are known to be or are suspected in an area, but there are no visible munitions that pose an immediate threat. In non-emergency situations, the military service has time to characterize the site and, if necessary, investigate and remove any suspect items.

5.3.1 Emergency Response Procedures for Reporting UXO or DMM Encounters

MEC encounters should be reported as soon as it is possible to do so safely. Private citizens who discover MEC should, after leaving the area, call 911 or immediately notify a BLM or FWS authority. Instructions for notifying authorities should be posted, along with instructions about safe reporting and other safety procedures. BLM and FWS personnel and law enforcement officers should contact the following offices.

BLM personnel: Call the local law enforcement office (bomb squad), 911, or the nearest military installation's EOD unit. Also notify the BLM ranger or call the hazardous materials coordinator at the BLM office, or BLM State office, that has jurisdiction for the site. If you cannot reach the hazardous materials coordinator, call the BLM State law enforcement office emergency number or the BLM national law enforcement office at (208) 387-5126.

FWS personnel: Call the local law enforcement office (bomb squad), 911, or the nearest military installation's EOD unit. Also, call the regional environmental compliance engineer or regional safety officer.

Both BLM and FWS hazardous materials staff should have a point of contact at the local military EOD unit for emergency response actions.

5.3.2 Details to Include in Reports on UXO or DMM Encounters

Remember, all observations should be made as far away as possible from the MEC.

The report should include as much of the following information as possible:

- Location of the MEC using a map, GPS coordinates, or landmarks (use of a GPS receiver is acceptable because it is a receive-only device)
- Who discovered the MEC and how they can be contacted
- Condition of the MEC (e.g., buried, partially exposed, fully exposed, corroded, punctured)
- Type of MEC (e.g., bomb, rocket, grenade, mortar)
- Number of MEC items visible
- Estimated size of MEC (e.g., length and diameter)
- Distinctive features of MEC (e.g., shape, color, markings)
- Nearby structures, if any (so inhabitants can be contacted and evacuated if necessary)
- Public access to the vicinity (i.e., open, closed)

5.3.3 Procedures for Requesting an Emergency Response

An emergency response may be undertaken at sites where the explosives or munitions pose an immediate danger. An emergency response is usually a short-term action that involves a local bomb squad or a military EOD unit responding to a specific observed item of ordnance.

When UXO or DMM has been observed and reported to the local law enforcement authority, BLM ranger, or FWS refuge officer, those authorities should evacuate and restrict access to the area. The law enforcement authority should contact the nearest EOD unit or military installation through existing local procedures for military support.

If the local law enforcement authority does not know which military unit to contact, then the local law enforcement authority should contact the U.S. Army Forces Command (FORSCOM), 52nd Ordnance Group (EOD), at its 24-hour emergency response number, (404) 469-3333. In the event the operations center cannot be contacted, the 52nd Ordnance Group S-3 (Operations) can be notified during normal duty hours (Eastern time zone) at (404) 469-3325. For Alaska and Hawaii, the contact is (808) 287-1524 (24-hour pager). This applies to the United States and its territories.

For BLM employees, if the local law enforcement authority does not respond, contact the BLM national law enforcement office at (208) 387-5127. The national office will ask the national interagency fire center's emergency response center to request military support.

A local bomb squad may respond at the request of the local law enforcement authority. The use of the civilian bomb squad depends on its level of training for military munitions and on existing protocols between the military service and the local government.

If responding military EOD personnel determine that the response action is not an emergency or is not within their capability, they will contact the appropriate authority to respond to the incident. If a MEC risk remains after the EOD unit's emergency response is completed, the Federal land manager should follow the procedures for a non-emergency MEC munitions response action.

5.3.4 Reporting Procedure for Requesting a Non-emergency Response

The military services will conduct a non-emergency munitions response at sites where an

emergency response has been completed and follow-up work is necessary, or at sites where MEC generally is known or suspected because of prior military use. In either case, a non-emergency response generally is a long-term action involving a site survey, site characterization, MEC removal, land use controls, risk management measures, and periodic evaluation to determine if additional munitions response actions are necessary.

Most sites with MEC will fall under one of three DoD-funded programs, depending on the date lands were or will be transferred to BLM or FWS management and on the method of transfer.

5.3.4.1 Formerly Used Defense Sites (FUDS) Program

The FUDS program is managed by USACE. Every USACE District Office has a FUDS coordinator. FUDS lands generally include any lands that were used by the military services or their contractors and that were transferred to BLM or FWS management on or before October 16, 1986. However, the FUDS program does not include former battlefields (e.g., Aleutian Islands), cemeteries, and certain sites.

5.3.4.2 Installation Restoration Program (IRP)

The individual military services are responsible for their bases' IRPs. All lands transferred to BLM or FWS management on or after October 17, 1986, fall within this program, unless they are listed as a Base Realignment and Closure (BRAC) Act site. The USACE FUDS coordinator should know which service and installation to contact. Also, a check of the historical index of BLM's master title plats or FWS's land records should indicate which military service and military organization used the lands. Generally, although the military service is responsible for munitions response actions, Air Force and Army installations will contract with USACE to accomplish MEC removal. Navy installations contract with Naval Facilities Engineering Command (NAVFAC) to accomplish MEC removal.

5.3.4.3 Base Realignment and Closure (BRAC) Program

The BRAC program started in 1988 with the passage of the first Base Realignment and Closure Act. As of 2005, five BRAC rounds are in progress. The military uses only BRAC funds to remove MEC from installations closed by those laws. Again, the military services are responsible for their own installations, but they normally contract with USACE or NAVFAC to perform MEC removal.

5.4 ROLE OF THE BLM AND FWS LAND MANAGER

BLM and FWS land managers are responsible for actions taken by all parties on the lands they manage. The military service personnel have expertise relating to explosives and munitions response operations. The BLM or FWS manager's responsibility is to ensure that the military's proposed actions are compatible with the agency's goals for land and resources management while they meet risk reduction goals.

For an emergency munitions response, the land manager's role is to ensure that no one enters the site without authorization until the EOD unit or bomb squad removes the hazard. Without delaying the emergency munitions response action, the Federal land manager should evaluate available information on important natural and cultural resources that might be affected by the action. All reasonable efforts should be made to protect those resources.

For a non-emergency munitions response, the BLM or FWS must authorize the proposed action before the bomb squad or EOD unit begins the munitions response action.

The BLM or FWS manager has oversight of land use controls used in the long-term risk management for the MEC site (see Chapter 4). The BLM or FWS may have responsibility for implementation and enforcement of land use controls, or those responsibilities may be retained by DoD.

5.5 INFORMATION FOR VISITORS AND AUTHORIZED USERS ABOUT UXO AND DMM

Public lands provide visitors with a vast array of recreational opportunities. These include hunting, fishing, camping, hiking, boating, hang gliding, off-highway vehicle driving, mountain biking, birding, and visiting natural and cultural heritage sites. A significant number of visitors are interested in "getting away from it all" and exploring areas removed from visitor facilities and trails. In the future, as the nation's population grows and urban areas expand, increasing demands for outdoor recreation will lead to the need to protect visitors in areas on public lands that are known or likely to contain MEC.

Land managers should provide UXO and DMM information to visitors and authorized users of public lands and refuges to ensure their safe access and use of the lands. The BLM or FWS can convey this information through written materials (e.g., brochures), briefings, videos, or a combination of these methods. Information should include site-specific access information, types of UXO or DMM that might be encountered at the site (with pictures), and the likelihood of an encounter.

Briefings are ideal opportunities for land managers to provide information to authorized visitors at controlled access locations. The briefing can be an entrance requirement at Federal lands that were former military ranges and would allow visitors to ask questions and plan or modify their activities based on the likelihood of potential MEC encounters. Short safety videos and written materials can be ordered from DoD, the Army Environmental Center (AEC), and USACE Huntsville (see Appendix 2).

5.5.1 Hold-Harmless Waiver

In most locations, Federal land managers require visitors and other authorized users to sign a statement acknowledging that they have read the safety material and hold the U.S. Government harmless for any MEC incidents. The required waiver (see Appendix 4) helps to emphasize the need to behave safely. The waiver demonstrates that the land manager has provided information about known and unknown risks to visitors.

5.5.2 Web Site

The following MEC safety web site provides samples of signage, informational material, video clips, and more: http://www.denix.osd.mil/denix/Public/Library/Explosives/UXOSafety/uxosafety.html.

Chapter 6

MEC Site Characterization and Munitions Response Operations

Acronym	List
ADNT	Aminodinitrotoluene
AEC	Army Environmental Center
BIP	Blow-in-place
BRAC	Base Realignment and Closure
DNA	Dinitroaniline
DNB	Dinitrobenzene
EMI	Electromagnetic induction
EOD	Explosive ordnance disposal
EPA	Environmental Protection Agency
FUDS	Formerly used defense site
GPR	Ground penetrating radar
GPS	Global positioning system
HMX	Her Majesty's explosive or high melting explosive
IR	Infrared
JUXOCO	Joint Unexploded Ordnance Coordination Office
MTADS	Multisensor Towed Array Detection System
RDX	Royal demolition explosive
SAR	Synthetic aperture radar
TNB	Trinitrobenzene
TNT	Trinitrotoluene

MEC site characterization and munitions response operations are the responsibility of the military services. However, the BLM and FWS are responsible for identifying their agencies' priorities for the munitions response, for describing expected land use, and for concurring with and overseeing the military service's operations on BLM- and FWS-managed lands. Representatives of the BLM or FWS become part of a project team, which also consists of the military service project office, the EPA, and the State's environmental department.

6.1 PROCEDURE FOR REQUESTING TECHNICAL SUPPORT FROM DOD

Requests for technical support from DoD for munitions response, including site characterization and munitions response operations, will be submitted to different military organizations, depending on the type of munitions response site involved:

- For formerly used defense sites (FUDS) — Send requests to the supporting U.S. Army Corps of Engineers district office.
- For base realignment and closure (BRAC) lands — Send requests to the military installation or command that was responsible for remediation and transfer of the lands. If that office no longer exists, the BLM or FWS headquarters' point of contact will forward the request to the appropriate military office.
- For sites that are neither FUDS nor BRAC — Send requests to the appropriate BLM headquarters' military liaison or to the point of contact at the FWS headquarters' Division of Engineering, Environmental and Facility Compliance, who will forward the request to the appropriate military office.

The BLM or FWS headquarters staff will contact, as appropriate, Headquarters USACE, Headquarters Naval Facilities Engineering Command, Air Force Real Estate Agency, or the DoD office responsible for munitions response

policy to determine the appropriate munitions response organization.

The request for support should include the following information, if known:

- Site name
- Site location
- Type of support, such as the following:
  - Site characterization
  - Surface munitions response
  - Subsurface munitions response
- Narrative about site use (who, what, when, where, and how), such as the following:
  - Period of use by the military
  - Type of training (how site was used)
  - Types of munitions used
- BLM or FWS point of contact

6.2 SITE CHARACTERIZATION

Site characterization is the investigation of known or suspected MEC areas to determine the presence or absence of MEC and to gather other information such as type, density, depth, or lateral extent of the MEC. Former military properties are characterized to provide a baseline for determining whether the selected risk reduction measures will be adequate for the proposed land uses. Characterization of these former military properties requires searching for discrete metallic objectives on the surface or buried beneath the surface. The objects may be located in concentrated areas in association with a specific target, or distributed randomly in a wide variety of areas. Knowing where to look depends on historical knowledge of the munitions activities that took place at the site and a documented conceptual site model. DoD has conducted tests and demonstration projects and still finds that many UXO detection and discrimination systems or procedures are less reliable than desired. UXO discrimination systems are designed to differentiate a UXO explosive item from scrap metal. The military services sponsor research and development programs to improve UXO detection and discrimination. Current information is available from the DoD Joint Unexploded Ordnance Coordination Office (JUXOCO) at the web site http://www.denix.osd.mil.

The site characterization process should also include an environmental investigation to determine if the site is contaminated with chemical constituents from munitions. Some of the specific chemicals used in munitions are 2,4,6-trinitrotoluene (TNT); 1,3,5-trinitrobenzene (TNB); 1,3-dinitrobenzene (DNB); 3,5-dinitroaniline (DNA); 2-amino-4,6-dinitrotoluene (ADNT); 1,3,5-trinitro-1,3,5-triazine (RDX, or royal demolition explosive); HMX (Her Majesty's explosive or high melting explosive); perchlorate; and tetryl. If concentrations of these chemicals are sufficiently high (more than 10 percent), the soils are potentially explosive. In addition, ambient concentrations of these chemicals may be toxic to biota and contaminate surface and groundwater.

If MEC is found anywhere on the site, additional site characterization and remediation are required. BLM personnel should consult State or regional BLM environmental specialists for more specific environmental investigation information. FWS personnel should contact the environmental contaminants specialist in the Ecological Services Field Office and the Environmental and Facility Compliance Office in the Division of Engineering.

6.3 SITE CHARACTERIZATION TECHNOLOGIES

Two primary technologies are deployed on a number of different platforms to characterize sites and detect UXO and DMM: magnetometers and electromagnetic induction (EMI) sensors. They each have strengths and weak-

nesses depending on the specific munitions items for which they are searching, the manner in which the weapon system was deployed (and the resulting maximum depth of the munition), and the physical environment at the site being investigated.

This section describes these primary technologies, a variety of secondary technologies that may be helpful in specific circumstances, plus technology advancements.

6.3.1 Primary Technologies

This section describes the two primary technologies used to detect subsurface UXO and DMM: magnetometry and electromagnetic induction.

6.3.1.1 Magnetometry

Magnetometers measure variations in the magnetic field of the Earth. Iron (ferrous) objects or minerals on the surface or in the subsurface cause local distortions or anomalies in that field. Magnetometers locate buried iron objects, including UXO or DMM, by detecting those distortions.

A typical magnetometer consists of a detection sensor, power supply, computer data system, and means to record the locations of detected anomalies. More advanced magnetometers incorporate a navigational system, such as a differential global positioning system (GPS), to determine location.

The effectiveness of magnetometers depends on their sensitivity, distance between the sensor and UXO or DMM, amount of iron material in the UXO or DMM, background magnetic noise, and site-specific soil properties. Recent demonstrations show that newer systems detect 70 to 90 percent of the UXO or DMM. These systems generally are used with the sensor head only a few inches above the ground.

There are numerous types of magnetometers (see ***Figures 13-15***). Gradiometers, which are systems of two magnetometers configured to measure the spatial rate of change in the magnetic field, are widely used to detect UXO and DMM. Helicopter-borne systems fly 6 to 10 feet above the ground. However, at that height the system loses the ability to detect small- and medium-caliber projectiles. Other magnetometers are available that have improved detection sensitivity for specific soil conditions.

6.3.1.2 Electromagnetic Induction

Electromagnetic induction (EMI) sensors detect both ferrous and nonferrous metallic objects. EMI systems transmit electric current into the soil to detect metallic objects. The systems measure either the secondary magnetic field induced in metal objects or the difference between the electrical conductivity of the soil and the electrical conductivity of buried objects, such as UXO (see ***Figures 16-18***).

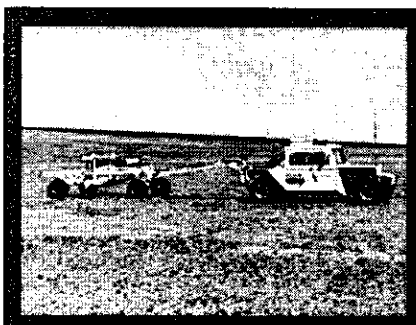


Figure 13 – *Multisensor Towed Array Detection System (MTADS) configured with cesium vapor magnetometers. Photo courtesy of Blackhawk Geometrics.*

Figure 14 – *Cart system configured with cesium vapor magnetometers. Photo courtesy of Blackhawk Geometrics.*

Figure 15 – *Helicopter configured with magnetometers for UXO and DMM detection. Photo courtesy of Oak Ridge National Laboratory.*

Figure 16 – MTADS configured with EMI sensors. Photo courtesy of Blackhawk Geometrics.

6.3.2 Secondary Technologies

The secondary technologies described below have a number of limitations, but they may be useful in selected site-specific circumstances.

6.3.2.1 Infrared Sensors

Infrared (IR) sensor technologies detect UXO and DMM by distinguishing between the temperature of the UXO or DMM and the surrounding soil. Metal objects heat and cool at a different rate than the surrounding soils. IR detectors locate UXO and DMM at or near ground surface by detecting those temperature differences. This technology is typically most effective on unvegetated or sparsely vegetated surfaces and when weather conditions and time of day provide the greatest temperature differential (see ***Figures 19-21***). IR technology has minimal capability to identify types or categories of UXO or DMM (e.g., mortar fins versus smooth artillery munitions).

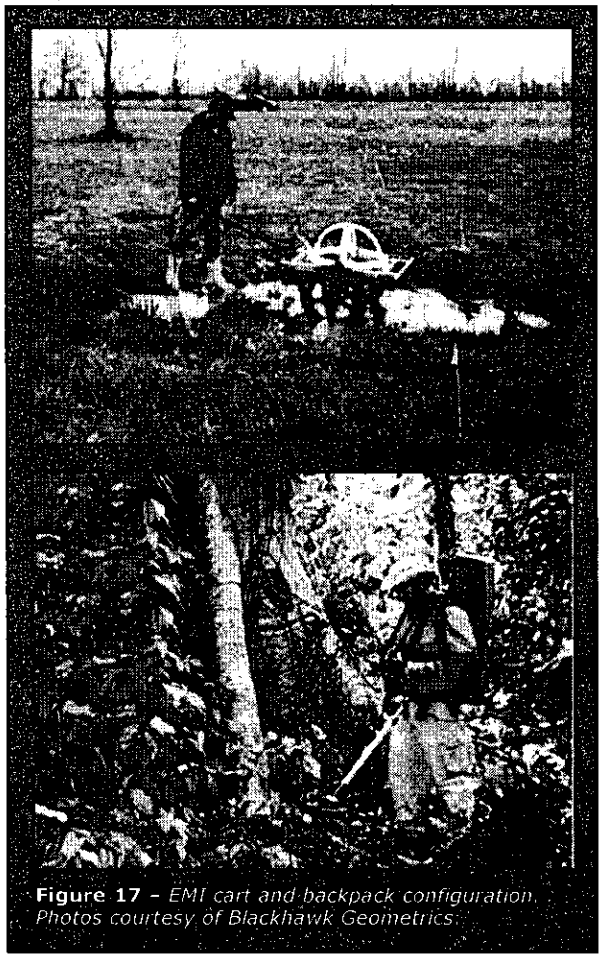


Figure 17 – EMI cart and backpack configuration. Photos courtesy of Blackhawk Geometrics.

Figure 18 – EMI skirt configuration. Photo courtesy of Blackhawk Geometrics.

6.3.2.2 Ground Penetrating Radar

Ground penetrating radar (GPR) is a radar system designed to penetrate the earth and return signals that indicate the nature of subsurface items.

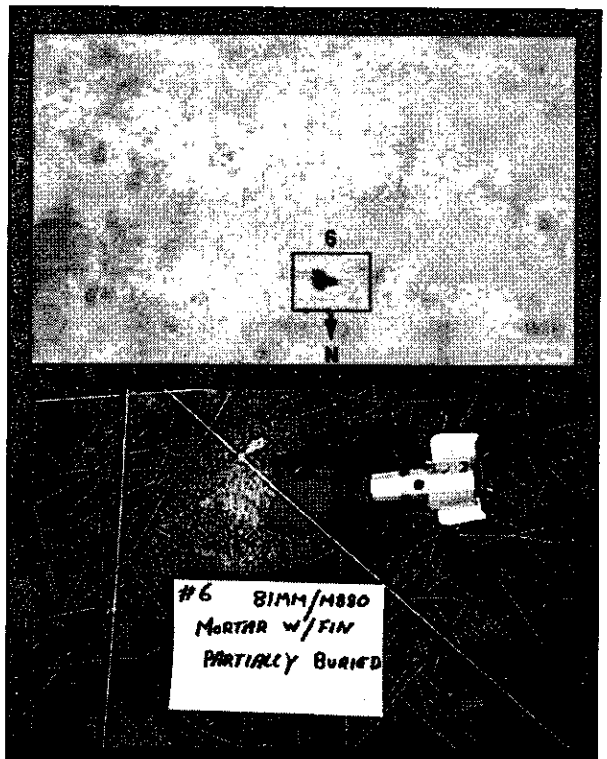


Figure 19 – *Airborne infrared and ground images of an 81 mm mortar. Photos courtesy of ORD-TECH.*

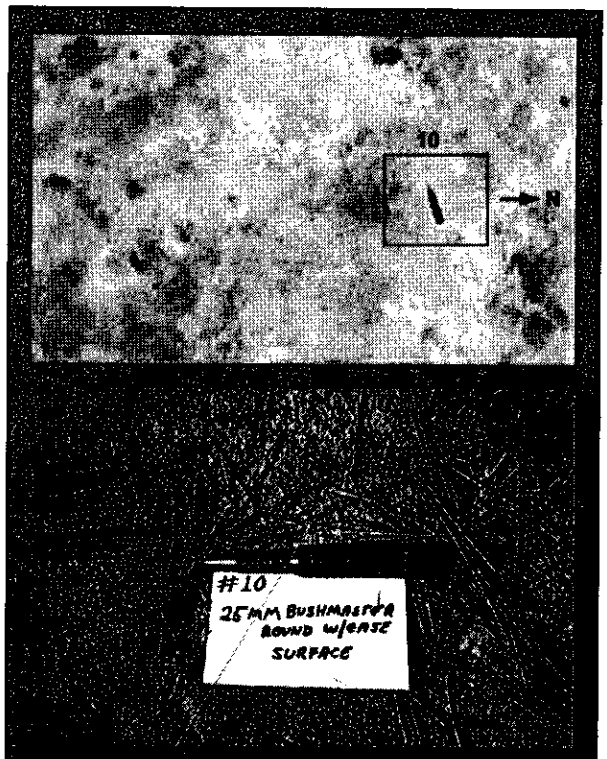


Figure 20 – *Airborne infrared and ground images of a 25 mm round. Photos courtesy of ORD-TECH.*

The main elements of any GPR system are the transmitter, receiver or antenna, controls, and display and recorder units. The transmitter directs short pulses of electromagnetic energy toward the ground. As the energy pulses travel into the ground, buried objects reflect signals back to the receiving unit. The processing and recording of these signals form an image.

Figure 21 – *ORD-TECH's helicopter with an advanced infrared detection system. Photo courtesy of ORD-TECH.*

Many environmental factors significantly affect the ability of GPR systems to produce accurate images. Important factors include the density and type of vegetative cover, water content of the vegetation and soil, and topography. In general, GPR is not effective in saturated soils and wet areas because water absorbs GPR energy.

Most GPR systems are on sleds that are pulled across the ground (see ***Figure 22***). Sensor heads, which are essentially in contact with the ground, provide deeper penetration of the ground and less surface-signal-return clutter. Signal penetration into the soil decreases with increasing distance between the sensor head and the ground, thus lowering the equipment's ability to discriminate small objects.

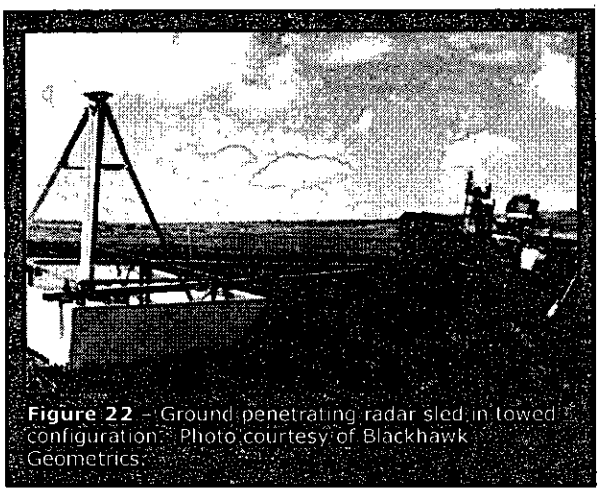


Figure 22 – Ground penetrating radar sled in towed configuration. Photo courtesy of Blackhawk Geometrics.

6.3.2.3 Synthetic Aperture Radar

Synthetic aperture radar (SAR) is an airborne system that provides a radar image of the land surface and objects on the surface. Metallic objects have a stronger radar signal return than nonmetallic objects. This allows for identification of metallic objects, both munitions-related and non-munitions-related. The synthetic aperture provides a high degree of surface image resolution even though the aircraft is flying at thousands of feet above the ground. This system can cover large areas at relatively low cost. SAR is effective at finding surface indicators of UXO and DMM as well as the actual munitions, thereby allowing more efficient and focused use of ground systems. SAR is not good at differentiating between sizes of metallic objects.

6.3.3 Technological Advancements

Industry continues to make significant technological advancements in UXO detection and in the ability to differentiate between UXO or DMM and non-UXO/DMM items. Use of these technologies increases UXO and DMM detection rates and reduces the number of false alarms (signal responses that indicate a possible UXO or DMM item when none is present, such as non-UXO/DMM ferrous metal or naturally occurring ferrous elements). False alarms are a major cost for munitions response operations. Reductions in false alarm rates increase efficiency and significantly decrease the cost of the munitions response operation. Technology advancements in UXO and DMM discrimination sciences are evolving rapidly. The U.S. Army Environmental Center (AEC) has information regarding the latest detection and discrimination technologies.

The combination of EMI and magnetometer sensors on a single platform appears to hold the highest promise for improving detection systems. Ongoing research and development efforts focus on the analysis of magnetometer and EMI signals to discriminate between ordnance and non-ordnance items. Although GPR is not as good as magnetometers or EMI at detecting UXO and DMM, GPR systems show promise for discrimination of detected objects.

Finally, recent demonstrations by the DoD Environmental Security and Technology Certification Program (ESTCP) suggest that data from high airborne light detection and ranging (LiDAR) systems and orthophotography offer promise in identifying potential munitions-related features in large, open range areas such as those frequently found in the West.

6.4 MUNITIONS RESPONSE OPERATIONS

Response operations at former military sites typically include the remediation of many different types of hazards, such as MEC, range debris, and possibly radioactive contaminants associated with range debris. Munitions response actions often entail actual destruction of the MEC on-site (sometimes referred to as "blow-in-place," or BIP). Destroying the MEC on-site is the preferred method of disposal, as it involves less risk to the EOD team; however, it may leave some explosives residue. When MEC removal is deemed necessary, such as the discovery of MEC in a residential area, specially trained and certified EOD professionals must perform the removal action or the *render safe* procedure. Render safe usually means removing the fuze or

disrupting the fuze train of the UXO or DMM so that it will not explode.

The emergency contacts listed at the beginning of this handbook will call the military ordnance experts to evaluate and remove or neutralize (destroy or render safe) any MEC found on BLM or FWS sites. In some areas, a local police unit or the hazardous materials response squad from the fire department may respond to a MEC discovery. For large-scale, non-emergency MEC removal operations, DoD will hire UXO contractors to conduct the munitions response operations. These types of operations typically will involve the formation of a project team.

6.5 SELECTION OF A RESPONSE ACTION

Munitions response actions reduce risk from exposure to MEC by removing some or all MEC from an area in response operations. The BLM or FWS and the military jointly determine the extent of a response action by considering the following:

- Reasonably anticipated future land use
- Boundaries of the areas to be investigated and remediated
- Effectiveness of risk reduction
- Environmental impact from response operations
- Cost

Evaluation of these factors is embodied in the analysis conducted under the remedy selection process associated with the Comprehensive Environmental Response, Compensation, and Liability Act (see Chapter 7).

Using the military installation's historical records and current information provided by the BLM or FWS, the military services will do the following:

- Research all archival material to determine when, where, and how the military used the lands
- Determine the types of known or suspected MEC
- Define the locations and depths of MEC
- Develop a conceptual site model of the munitions response area
- Remove or neutralize the MEC
- Document the process
- Provide continued surveillance of areas where MEC is to remain above the frost line but below the removal depth

It is the position of the BLM and FWS that the military services are obligated to perform a new MEC site characterization or additional munitions response operations when changes in land use are proposed. The military services sometimes do not agree with this position and maintain that they will return to do additional munitions response only if Congress or a court order mandates the land use change. The BLM and FWS manager should consider the cost and risk to EOD personnel and alternatives available before proposing a land use change on lands containing MEC. This is an unresolved principle that the DoD and DOI are still discussing.

The BLM and FWS have no established standards for describing the depth of munitions removal at a munitions response site. The depth of removal will be developed at each munitions response site by the site's project team. The project team should consider current and future management actions that are likely to occur on-site and the depth to which the response actions will penetrate the subsurface. Examples of typical actions in which depth will be a consideration include fence construction to the depth of the post holes; road or pipeline construction because of excavation; intrusive wildland firefighting actions such as construction of firebreaks and associated restoration activities; activities associated with prescribed burning; and vegetation management actions such as seeding,

invasive species removal and eradication, and habitat modification.

6.6 MEC EXCAVATION TECHNOLOGIES

MEC removal may cause the detonation of explosives or the release of hazardous or toxic materials. EOD specialists or UXO technicians must perform all removal operations. The project munitions response team will determine the site-specific procedures for MEC removal. Although a detailed discussion of the excavation procedures associated with removal of MEC is beyond the scope of this handbook, the following sections provide a general overview of available excavation technologies.

Historically, MEC excavation primarily involved labor-intensive manual methods. Since the 1980s, research and development efforts have focused on increased mechanization to improve efficiency and enhance operator safety. The major categories of excavation technologies are manual methods, mechanized systems, and remote-controlled systems.

6.6.1 Manual Methods

Standard manual excavation involves the use of shovels and other digging tools to excavate soil and expose potential MEC. Manual methods work best for MEC in the near-surface and shallow subsurface (not more than 24 inches deep). Manual methods present significant safety risks to workers.

6.6.2 Mechanized Systems

Mechanized MEC excavation systems include excavators, bulldozers, front-end loaders, and other heavy construction equipment. Historically, backhoe-type excavators were the most commonly used mechanized system. Vacuum excavators, another kind of mechanized system, use a high-pressure jet of air to penetrate and dislodge soil, then use a vacuum to extract the dislodged soil (to expose the MEC), and finally transport the soil away using a conveyor belt.

6.6.3 Remote-Controlled Systems

Remote-controlled MEC excavation systems include telerobotic and autonomous systems. In general, the capabilities, effectiveness, and use of remote-controlled systems are the same as for mechanized systems. The primary difference is that the operator of a remote-controlled system remains outside the immediate hazard area. Of the three categories of MEC excavation methods, remote-controlled systems offer the highest degree of safety, but they may also be the slowest and most expensive.

Chapter 7

MEC-Related Statutes, Policies, and References

Acronym List

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DMM	Discarded military munitions
DOI	Department of the Interior
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FUDS	Formerly used defense site
MC	Munitions constituents
MEC	Munitions and explosives of concern
NEPA	National Environmental Policy Act
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
UXO	Unexploded ordnance

This chapter contains an overview of MEC-related statutes, policies, and references. For additional information, consult the applicable reference.

7.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

NEPA (42 U.S.C. §4231 *et seq.*) requires the BLM and FWS to ensure that environmental considerations are given appropriate weight during the decision-making process. It also requires Federal departments and agencies to perform an environmental evaluation of proposed actions that considers all alternatives in order to minimize potential environmental damage. The act requires the preparation of environmental documentation (environmental assessments and environmental impact statements) to evaluate the potential environmental effects of a proposed action and any unavoidable adverse environmental effects.

The selection of cleanup alternatives under CERCLA does not require a NEPA assessment, as CERCLA is considered to be the functional equivalent of NEPA, and the CERCLA remedy selection process (either removal or remedial) stands in place of a NEPA assessment.

7.2 RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

RCRA (42 U.S.C. §6901 *et seq.*) provides the comprehensive Federal regulation for the collection, treatment, storage, and disposal of solid waste, including hazardous waste.

Munitions, used for their intended purpose, at some point become solid waste potentially subject to RCRA and also may include hazardous substances, pollutants or contaminants subject to CERCLA. It is EPA's position that munitions become a statutory solid waste when EPA or a state determines they have been left in the environment long enough to be considered "discarded" within the statutory definition of "solid waste." UXO and DMM are not listed as hazardous waste under RCRA; however, when managed, they will become hazardous waste if they fail the RCRA hazardous waste characteristics tests (e.g., toxicity, ignitability, reactivity, and corrosivity). MC may in some instances be listed as hazardous waste, or it may become a

regulated waste if it fails one of the RCRA hazardous waste characteristics tests.

RCRA also contains corrective action requirements that apply to the cleanup of old hazardous waste units. Depending upon State preferences, a munitions response action may be conducted under RCRA or CERCLA but must be consistent with both.

7.3 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA; 42 U.S.C. §9601 *et seq.*), prescribes reporting and investigation requirements for hazardous substance releases and for cleanup of sites. CERCLA imposes potential liability for owners or operators (including Federal agencies) of land containing hazardous substances. The National Contingency Plan contains the implementing regulations for CERCLA (40 CFR §300). CERCLA is the primary authority directing the military's munitions response activities. The DoD has asserted a preference for conducting response actions under CERCLA rather than RCRA.

7.4 ENDANGERED SPECIES ACT OF 1973

The Endangered Species Act (ESA) of 1973 (16 U.S.C. §1531 *et seq.*) protects plant and animal species formally listed as threatened or endangered by the Secretary of the Interior (terrestrial and freshwater species and some marine species) or the Secretary of Commerce (other marine species). The act calls for the listing of species to be based solely on scientific data. As of September 2003, 1,263 U.S. species and 558 foreign species were listed as threatened or endangered. Once a species is listed, section 7 of the ESA directs Federal agencies to consult with the FWS or the National Maritime Fisheries Service to ensure that any actions the Federal agencies authorize, fund, or carry out do not jeopardize the continued existence of any listed species or destroy critical habitat.

7.5 DEPARTMENT OF THE INTERIOR MANUAL

The DOI Departmental Manual, Part 602, Chapter 2 ("Real Property Pre-Acquisition Environmental Site Assessment" in the Public Lands Series on Land Acquisition, Exchange, and Disposal) describes departmental policy, responsibilities, and functions regarding liability and risk. Before real property is acquired (including withdrawn public lands that are returning to the jurisdiction of the Secretary of the Interior), the DOI agency acquiring the property is required to determine if hazardous material, including MEC, are present. If hazardous materials are present, the extent of DOI's exposure to cleanup liability and other associated risks must be evaluated.

7.6 DEPARTMENT OF THE ARMY TECHNICAL MANUAL, AMMUNITION, GENERAL

The Technical Manual, Ammunition, General, was published by the Department of the Army in 1969 (TM 9-1300-200) and reprinted in 1993. The manual provides a comprehensive report of U.S. military munitions, munitions data, illustrations, munitions packaging information, and labeling and marking of munitions.

7.7 UNEXPLODED ORDNANCE (UXO) PROCEDURES FIELD MANUAL

The *Unexploded Ordnance (UXO) Procedures* field manual was published by the Department of the Army in 1981 (FM 21-16) and reprinted in 1994. This document is designed for military identification and removal operations for UXO resulting from battlefield operations. This manual provides very good background on UXO identification, munitions photographs, and removal techniques.

Glossary

Active range: A military range that is currently in service and is being regularly used for range activities.

Anomaly avoidance: Techniques employed on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or chemical agent (CA), regardless of configuration, to avoid contact with potential surface or subsurface explosive or CA hazards, to allow entry to the area for the performance of required operations.

Arming device: A device designed to perform the electrical and/or mechanical alignment necessary to initiate an explosive train.

Base Realignment and Closure (BRAC): BRAC is a process DoD has used to reorganize its installation infrastructure to more efficiently and effectively support its forces, increase operational readiness, and facilitate new ways of doing business.

Blow-in-place: The method used to destroy UXO or DMM, by use of explosives, in the location the item is encountered.

Caliber: The diameter of a projectile or the bore of a gun or launching tube expressed in millimeters or inches. When caliber is given only as a number, such as .50, it is in inches. A caliber given in millimeters will always have "mm" after the number.

Chemical agent (CA): A chemical compound (including experimental compounds) that is intended for use in military operations to kill, seriously injure, or incapacitate persons through its chemical properties that produce lethal or other damaging effects on human beings. Excluded are research, development, testing, and evaluation (RDTE) solutions; riot control agents; chemical defoliants and herbicides; smoke and other obscuration materials; flame and incendiary materials; and industrial chemicals.

Clearance: The removal of UXO or DMM from the surface and subsurface at operational ranges.

Closed range: A military range that has been taken out of service and either has been put to new uses that are incompatible with range activities or a range that is not considered by the military to be a potential range area. A closed range is still under the control of a military service.

Construction support: Assistance provided by EOD- or UXO-qualified DoD personnel or personnel trained and qualified for operations involving chemical agent (CA), regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration.

Defense sites: Locations that are or were owned by, leased to, or otherwise possessed or used by the Department of Defense. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used for or was permitted for the treatment or disposal of military munitions. (10 U.S.C. §2710(e)(1))

Detonation: A violent chemical reaction within a chemical compound or mechanical mixture evolving heat and pressure. The result of the chemical reaction is exertion of extremely high pressure on the surrounding medium.

Discarded military munitions (DMM): Military munitions that have been abandoned without proper disposal or have been removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 U.S.C. §2710(e)(2))

Electromagnetic induction (EMI): The transfer of an electrical field from one item to another, causing a magnetic field resonance in the object that can be detected by sensors.

Engineering controls (land use): Any physical barriers or actions that are designed to limit access to locations where MEC is believed to exist, such as fencing, signage, and cap and cover systems.

Explosion: A chemical reaction of any chemical compound or mechanical mixture that, when initiated, undergoes a very rapid combustion or decomposition, releasing large volumes of highly heated gases that exert pressure on the surrounding medium. Also, a mechanical reaction in which failure of the container causes sudden release of pressure from within a pressure vessel.

Explosive: A substance or mixture of substances that can undergo a rapid chemical change, generating large quantities of energy generally accompanied by hot gases.

Explosive hazard: A condition where danger exists because explosives are present that may react (e.g., detonate, deflagrate) and result in death or injury of people or damage to property, operational capability, or the environment.

Explosive ordnance disposal (EOD): The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded ordnance and of other munitions that have become an imposing danger, for example, by damage or deterioration.

Explosive ordnance disposal incident: The suspected or detected presence of UXO or damaged military munitions that constitute a hazard to operations, installations, personnel, or material. Each EOD response to reported UXO or DMM is an EOD incident.

Explosive ordnance disposal personnel: Military personnel who have graduated from the Naval School, Explosive Ordnance Disposal; are assigned to a military unit with a service-defined EOD mission; and meet service and assigned unit requirements to perform EOD duties. EOD personnel have received specialized training to address explosive and certain chemical hazards during both peacetime and wartime. EOD personnel are trained and equipped to perform render-safe procedures on nuclear, biological, chemical, and conventional munitions, and on improvised explosive devices.

Explosive ordnance disposal response: The safe recovery and final disposal of UXO or munitions. An EOD response may also include actions to render-safe or dispose of explosive ordnance that has become hazardous by damage or deterioration, when the disposal of such items is beyond the capabilities of the personnel normally assigned the responsibilities for routine disposal.

Explosive ordnance disposal unit: A military organization constituted by proper authority, manned with EOD personnel, outfitted with equipment required to perform EOD functions, and assigned an EOD mission.

Explosive soil: Any mixture of explosives with soil, sand, clay, or other solid media at concentrations that cause the mixture itself to be reactive or ignitable. Defined by the USACE as soil that is composed of more than 10 percent reactive or ignitable material.

Explosive train: The arrangement of different explosives in a sequence in which (1) a small quantity of an initiating compound or mixture, such as lead azide, is used to detonate a larger quantity of (2) a booster compound, such as tetryl, which results in (3) RDX, TNT, or other compounds detonating.

Explosives or munitions emergency response: All immediate response activities by an explosives and munitions emergency response specialist to control, mitigate, or eliminate the actual or potential threat encountered during an explosives or munitions emergency. An explosives or munitions emergency response may include in-place render-safe procedures, treatment or destruction of the explosives or munitions, and/or transporting of those items to another location to be rendered safe, treated, or destroyed. Any reasonable delay in the completion of an explosives or munitions emergency response caused by a necessary, unforeseen, or uncontrolled circumstance will not terminate the explosives or munitions emergency. Explosives and munitions emergency responses can occur on either public or private lands and are not limited to responses at RCRA facilities. (Military Munitions Rule, 40 CFR §260.10)

Flares: Devices that are dropped or fired as a projectile. They normally consist of a magnesium compound that burns at very high temperatures, a fuze that initiates the burning process, and possibly a parachute, all contained in a canister. Flares as UXO will normally be found on or near the ground surface. The danger from a flare is both from the fuze used to ignite the flare and the intense heat from the burning flare.

Fragmentation: Characteristic of ordnance that is primarily intended to produce many small fragments (shrapnel) for the purpose of killing personnel or damaging soft targets.

Fuse: A cord of readily combustible material that is lit at one end to carry a flame along its length to detonate an explosive at the other end (e.g., firecracker).

Fuze: A mechanical or electrical device with explosive or non-explosive components designed to initiate a train of fire or detonation in ordnance.

Fuze, delay: Any impact fuze incorporating a means of delaying its action after contact with the target. The delay duration classifies the fuze. A chemical or timing device can cause the delay.

Fuze, impact: A fuze in which the force of impact initiates detonation. This fuze may activate instantaneously or after a short delay.

Fuze, proximity: A fuze that is activated when it remotely senses the presence, distance, or direction of the target through the characteristics of the target itself or its environment. Noise, vibration, movement, magnetic signature, or radio signal may cause activation.

Gradiometer: Magnetometer for measuring the rate of change of a magnetic field.

Ground penetrating radar (GPR): A system that uses pulsed radar waves to penetrate the ground and measure the distance and direction of subsurface targets through radar waves that are reflected back to the system.

Hazardous substance: (A) any substance designated pursuant to section 311(b)(2)(A) of the Federal Water Pollution Control Act [33 U.S.C. §1321 (b)(2)(A)]; (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title; (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act [42 U.S.C. §6921] (but not including any waste the regulation of which under the Solid Waste Disposal Act [42 U.S.C. §6901 *et seq.*] has been suspended by Act of Congress); (D) any toxic pollutant listed under section 307(a) of the Federal Water Pollution Control Act [33 U.S.C. §1317 (a)]; (E) any hazardous air pollutant listed under section 112 of the Clean Air Act [42 U.S.C. §7412]; and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act [15 U.S.C. §2606]. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). (42 U.S.C. §9601(14))

Illumination: A term applied to ordnance indicating its ability to produce high-intensity light. The ordnance usually contains a magnesium flare and may contain a parachute for suspension in the air.

Inactive range: A military range that is not currently being used but is still under military control, is considered by the military to be a potential range area, and has not been put to a new use that is not compatible with range activities.

Incendiary: Any flammable material used as filler in ordnance intended to destroy a target by fire, such as napalm and white phosphorus.

Inert: The state of some types of ordnance that (1) when used as designed leave only a harmless carrier, or (2) are manufactured without explosive, propellant, or pyrotechnic content. Inert ordnance poses no explosive hazard to personnel or material.

Installation: A grouping of facilities, located in the same vicinity, that support particular functions. Installations may be elements of a base.

Institutional controls (land use): Non-engineering measures designed to prevent or limit human exposure to hazardous substances left in place at a site or to ensure the effectiveness of the chosen remedy. Institutional controls are usually, but not always, legal controls, such as public access closures, withdrawal and reservation of lands for public safety purposes, and notations on official land records.

Land use controls: Any type of physical, legal, or administrative mechanism that restricts the use of, or limits access to, property to prevent or reduce risks to human health and the environment.

Magnetometer: An instrument for measuring the intensity and direction of magnetic fields.

Material potentially presenting an explosive hazard: Material potentially containing explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated with munitions production, demilitarization, or disposal operation). Excluded from this definition are munitions within DoD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans or compressed gas cylinders that are not munitions and are not intended for use as munitions).

Military munitions: Ammunition products and components produced for or used by the armed forces for national defense and security. The term *military munitions* includes ammunition products or components under the control of the Department of Defense, the U.S. Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants; explosives; pyrotechnics; chemical and riot control agents; smokes and incendiaries; bulk explosives; chemical agents; chemical munitions; rockets; guided and ballistic missiles; bombs; warheads; mortar rounds; artillery ammunition; small arms ammunition; grenades; mines; torpedoes; depth charges; cluster munitions and dispensers; demolition charges; and devices and components thereof.

Military munitions do not include wholly inert items, improvised explosive devices, or nuclear weapons, nuclear devices, or nuclear components. However, military munitions do include non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. §2011 *et seq.*) have been completed. (10 U.S.C. §101(e)(4)(A) through (C))

Military munitions burial site: A site, regardless of location, where military munitions or CA, regardless of configuration, was intentionally buried, with the intent to abandon or discard in a manner consistent with applicable environmental laws and regulations or the national practice at the time of burial. It does not include sites where munitions were intentionally covered with earth during authorized destruction by detonation, or where in-situ capping is implemented as an engineered remedy under an authorized response action.

Military range: See "Operational Range" and "Range."

Munitions constituents (MC): Any materials originating from unexploded ordnance, discarded military munitions, or other military munitions, including explosive and non-explosive materials. MC also includes emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. §2710(e)(4)) [NOTE: Explosive munitions constituents in sufficient concentration to be explosive are included in the definition of "Munitions and Explosives of Concern".]

Munitions and explosives of concern (MEC): Specific categories of military munitions that may pose unique explosive risks, including:

(a) Unexploded ordnance (UXO), as defined in 10 U.S.C. §101(e)(5);
(b) Discarded military munitions (DMM), as defined in 10 U.S.C. §2710(e)(2); or
(c) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. §2710(e)(3), present in high enough concentrations to pose an explosive hazard. (Note: See "Munitions Constituents"). (Munitions constituents are MEC when explosive compounds of the munitions, such as TNT, RDX, and HMX, are in sufficient concentration as to pose an explosive hazard. This situation arises when concentration levels are 10 percent or more. Non-explosive munitions constituents and explosive concentrations less than 10 percent are not considered MEC.)

Munitions debris: Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, and fins) remaining after munitions use, demilitarization, or disposal.

Munitions response: Response actions, including investigation, removal actions, and remedial actions, to address the explosives safety, human health, or environmental risks presented by UXO, DMM, or MC, or to support a determination that no removal or remedial action is required.

Munitions response area: Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area consists of one or more munitions response sites.

Munitions response site: A discrete location within a munitions response area that is known to require a munitions response.

Obscurant: Man-made or naturally occurring particles suspended in the air that block or weaken the transmission of a particular part or parts of the electromagnetic spectrum.

Open burning (OB): An open-air combustion process by which excess, unserviceable, or obsolete munitions are destroyed to eliminate their inherent explosive hazards. The combustion of any material without (1) control of combustion air, (2) containment of the combustion reaction in an enclosed device, (3) mixing for complete combustion, and (4) control of emission of the gaseous combustion products.

Open detonation (OD): An open-air process used for the treatment of excess, unserviceable, or obsolete munitions whereby an explosive donor charge initiates the munitions being treated.

Operational range: A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or, although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities (10 U.S.C. §101(e)(3)(A) and (B)). Also includes "military range," "active range," and "inactive range" as those terms are defined in 40 CFR §266.201.

Ordnance: Military weapons collectively, including ammunition and the equipment to keep them in good repair; also includes explosives, chemicals, pyrotechnics, and similar materials (e.g., bombs, guns, ammunition, flares, smoke, and napalm).

Ordnance and explosives (OE) and ordnance and explosives waste: Formerly used terms that have been replaced by the term munitions and explosives of concern (MEC).

Pollutant or contaminant: The term *pollutant or contaminant* shall include, but not be limited to, any element, substance, compound, or mixture, including disease-causing agents, which, after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformations in such organisms or their offspring. The term *pollutant or contaminant* shall not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance (42 U.S.C. §9601 (14)) and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

Practice ordnance: Ordnance manufactured to serve a training purpose. Practice ordnance generally does not carry a full payload, but it may still contain explosive components such as spotting charges, bursters, and propulsion charges.

Projectile: An object launched by an applied force and continuing in motion by its own inertia, such as a bullet, bomb, shell, mortar, or grenade.

Propellant: An agent such as an explosive powder or fuel made to provide the necessary energy for propelling ordnance.

Range: When used in a geographic sense, a designated land or water area that is set aside, managed, and used by the Department of Defense for range activities. Ranges include the following areas:

(a) Firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads,

impact areas, electronic scoring sites, buffer zones with restricted access, and exclusionary areas.

(b) Airspace areas designated for military use in accordance with regulations and procedures prescribed by the administrator of the Federal Aviation Administration.

(10 U.S.C. §101(e)(1)(A) and (B))

Real property: Any land or an interest therein, and all buildings, structures, and improvements affixed to the land acquired by any Federal agency (such as the BLM or FWS), that is managed pursuant to the Federal Property and Administrative Services Act of 1949. Real property does not include lands withdrawn or reserved, from the public domain but does include lands or portions of lands withdrawn or reserved by the Secretary of the Interior, with the concurrence of the Administrator of General Services, if those lands are determined to be not suitable for return to the public domain for disposition under the general public land laws.

Real property acquisition: Real property obtained either through discretionary acts or by law—whether by way of condemnation, donation, escheat, right-of-entry, escrow, exchange, lapses, purchase, or transfer—that will be under the jurisdiction or control of any Federal agency (such as the BLM or FWS) and will be managed pursuant to the Federal Property and Administrative Services Act of 1949.

Remedial action: A type of response action under CERCLA. Remedial actions are those actions consistent with a permanent remedy, instead of or in addition to removal actions, to prevent or minimize the release of hazardous substances into the environment.

Removal action: Short-term response actions under CERCLA that address immediate threats to public health and the environment.

Render-safe procedures: The portion of EOD procedures involving the application of special EOD methods and tools to provide for the interruption of functions or separation of essential components of UXO to prevent an unacceptable detonation.

Response action: As defined in section 101 of CERCLA, "remove, removal, remedy, or remedial action, including enforcement activities related thereto." As used in this handbook, the term *response action* incorporates cleanup activities undertaken under any statutory authority.

Returning lands: Lands relinquished by the military service and returned to DOI when public lands that were withdrawn for military use are no longer needed for military purposes. When returning lands, DoD files a notice of intent to relinquish the lands with BLM (43 CFR §2372).

Small arms ammunition: Ammunition, without projectiles that contain explosives (other than tracers), that is .50 caliber or smaller, or for shotguns.

Smoke: A chemical filler for ordnance such as bombs, projectiles, and grenades that produces a cloud of smoke to mark a position or obscure a battlefield. The term is applied to ordnance to indicate that it is primarily intended to produce smoke to mark a position or obscure a battlefield.

Technical escort unit: A DoD organization of specially trained personnel that provide verification, sampling, detection, mitigation, rendering safe, decontamination, packaging, escort, and remediation of chemical, biological, and industrial devices or hazardous material.

Technology-aided surface removal: A removal of UXO, DMM, or chemical weapons material on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., hand-held magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM, or CWM; or other factors make visual detection difficult.

Time-critical removal action: Removal action where, based on the site evaluation, a determination is made that a removal is appropriate, and that less than 6 months exists before on-site removal activity must begin. (40 CFR §300.5)

Transferred range: A military range that has been released from military control. Transferred ranges have been transferred from DoD control to other Federal agencies, State or local agencies, tribes, or private entities.

Transferring range: Ranges in the process of being transferred from DoD control (e.g., sites that are at facilities closing under the Base Realignment and Closure Act or other authorities). The term also refers to a military range that is proposed to be leased, transferred, or returned from the Department of Defense to another entity, including Federal entities.

Unexploded ordnance (UXO): Military munitions that:

(a) have been primed, fuzed, armed, or otherwise prepared for action;
(b) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and
(c) remain unexploded whether by malfunction, design, or any other cause.

(10 U.S.C. §101(e)(5)(A) through (C))
P.L. 106-65, section 3031 (c)(5)(A) provides a more detailed description.

UXO technicians: Personnel who are qualified for and filling contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III, as defined by the Department of Labor, Service Contract Act, Directory of Occupations.

Warhead: The part of a missile, projectile, rocket, or other munition that contains the explosive system, chemical or biological agents, or inert materials intended to inflict damage.

White phosphorus: A chemical that, when exposed to air, burns spontaneously, producing dense clouds of white smoke.

Wildland fire: Any nonstructure fire that occurs in the wildland, other than prescribed fire.

Withdrawn public lands: Public lands that are removed from the operation of the public land laws and reserved for a specific Federal Government purpose.

Appendix 1

Military Munitions

This appendix describes military munitions commonly found as UXO on FUDS, BRAC, and other transferred properties. Being able to identify UXO is an important step in the UXO risk management process.

TYPES OF ORDNANCE

The following categories of ordnance are the most common types found in the field and are discussed in more detail in the following sections:

1. Small Arms Munitions
2. Hand Grenades
3. Rifle Grenades
4. Projected Grenades
5. Projectiles
6. Mortars
7. Rockets
8. Guided Missiles
9. Bombs
10. Submunitions
11. Land Mines
12. Flares
13. Fuzes

1. Small Arms Munitions

A small arms munition, normally called a *round*, is a single unit consisting of a cartridge for holding the propellant (explosive) charge, with the projectile (bullet) inserted in one end and the primer (initiating) charge in the other end. Small arms munitions can be fired from pistols, rifles, shotguns, and machine guns. Small arms munitions include projectiles of .50 caliber and smaller without an explosive warhead (see glossary). Photos of the 20 mm round and 20 mm projectile, which are considered medium-caliber munitions and may contain explosive projectiles, are included for size comparison (see ***Figure 23***). Although the hazards associated with small arms UXO are relatively minor, small arms munitions may explode if thrown into a fire or if the primer is struck with a sharp object such as a nail.

2. Hand Grenades

Hand grenades are small hand-thrown devices that contain explosive or chemical filler. A grenade has three main parts: a body, a fuze with

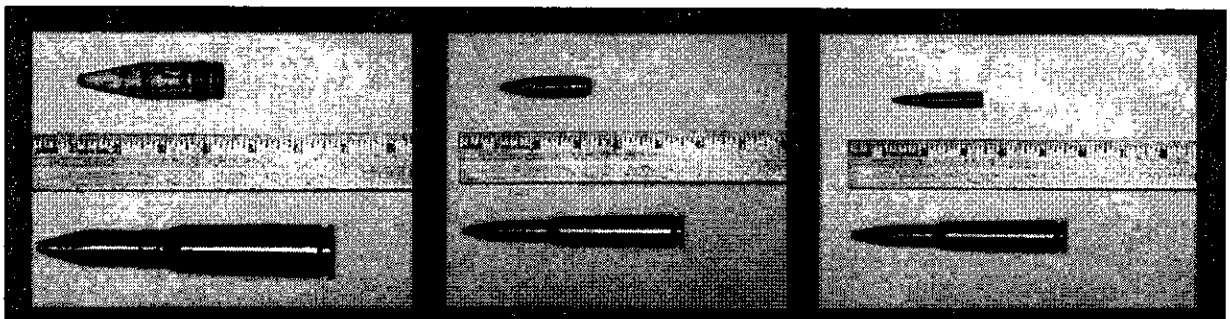


Figure 23 –*Left to right: a 20 mm round (medium caliber) compared with a 20 mm projectile; a .50-caliber round compared with a .50-caliber projectile; and a .50-caliber round compared with a .223-caliber round (used in an M-16 rifle).*

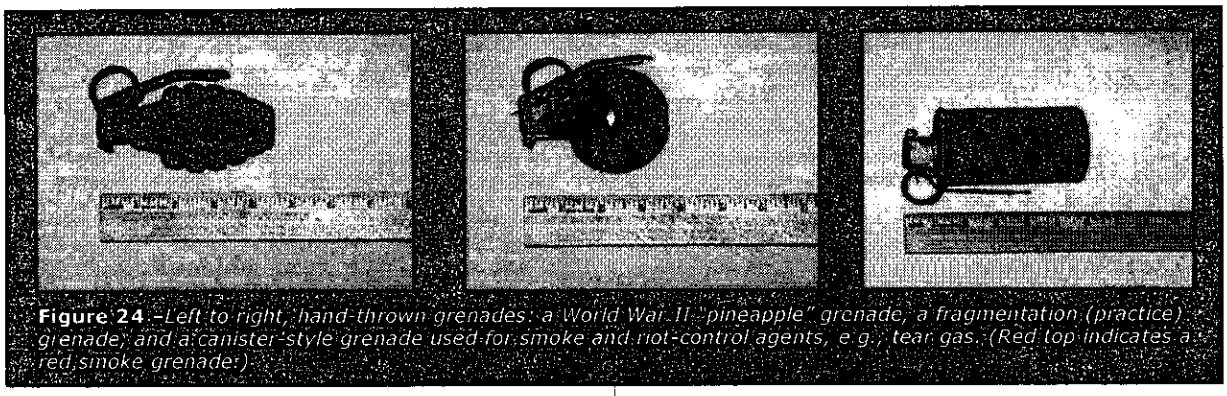


Figure 24 - Left to right, hand-thrown grenades: a World War II "pineapple" grenade, a fragmentation (practice) grenade, and a canister-style grenade used for smoke and riot-control agents, e.g., tear gas. (Red top indicates a red smoke grenade.)

a pull ring and safety clip, and a filler. Classes of grenades that can be encountered as UXO include fragmentation, smoke, chemical, and illumination grenades. The traditional "pineapple" fragmentation variety was used in World War II and the Korean War. The Vietnam-era and current fragmentation varieties look like a baseball. The smoke, chemical, and illumination grenades look like and are about the size of a soft drink can (see ***Figure 24***).

3. Rifle Grenades

Rifle grenades are grenades attached to a tube that fits over a rifle barrel. They range in length from about 9 to 17 inches. Special ammunition is used in the rifle to provide the force necessary to propel the grenade to the target. Rifle grenades typically contain high explosives, white phosphorus, riot-control agents, illumination flares, or chemicals that produce colored or screening smoke. Rifle grenades typically have impact fuzes either on the nose or behind the warhead.

4. Projected Grenades

Projected grenades replaced the rifle grenade in the early 1960s. The 40 mm grenade is about the size and shape of a goose egg and contains a high-explosive charge and a sensitive internal impact fuzing system. When the grenade is fired, the fuze is armed. If the fuze does not activate upon impact, the resulting UXO item is extremely dangerous and likely to explode if moved or handled. The small size, quantity of explosive, and fragmentation make this the most likely munition to cause death or injury to the public and employees on the public lands and refuges (see ***Figure 25***).

5. Projectiles

Projectiles range from approximately .223 to 16 inches in diameter and from 1 inch to 4 feet in length. Munitions that are .50 caliber and smaller do not contain an explosive charge. Munitions from 20 mm through 30 mm may contain a fuze and an explosive charge. All munitions larger than 30 mm should be assumed to have a fuze and an explosive charge, white phosphorus, or chemical agent. In general, the larger the munition, the larger the explosive charge or amount of chemical agent it will contain. Also, the larger the projectile, the greater the force of impact and, therefore, the deeper the projectile may penetrate into the soil (see ***Figure 26***).

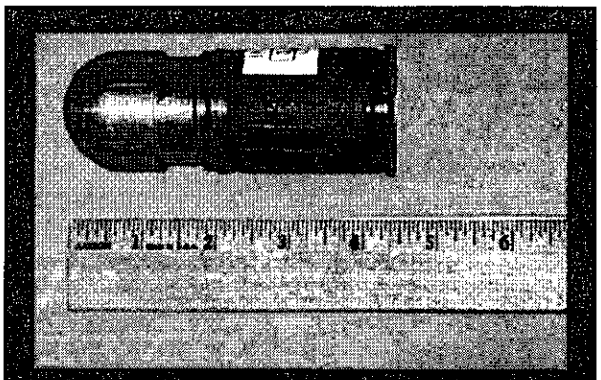


Figure 25 - The projected grenade's small size and appealing shape and color make it most likely to cause death or injury on public lands and refuges.

Figure 26 - Milt Williams, public information officer for the Idaho State Department of Lands, looks over some of the artillery shells on an old gunnery range in the Boise Foothills. Wildfire made the surface more visible and led to the discovery of these rounds. Reprinted with permission of the Idaho Statesman, photograph ©Tom Shanahan, September 20, 1996.

6. Mortars

A mortar is a type of projectile that has a very steep angle of impact. Mortars range from approximately 1 inch to 11 inches in diameter and are filled with explosives, toxic chemicals, white phosphorus, or illumination flares. The mortar fuze is normally in the nose (front) of the round, which is activated only after the round leaves the firing tube. The round normally has a tube with stabilizing fins behind the explosive warhead (see ***Figure 27***). Mortars, being fairly lightweight when compared with other larger projectiles, are generally found at or near the ground surface.

7. Rockets

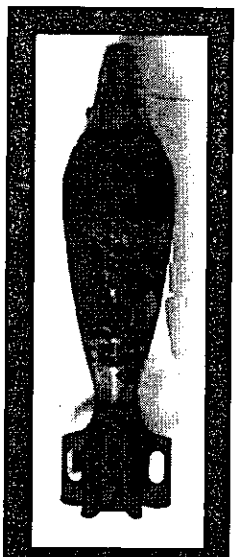


Figure 27 - 81 mm high-explosive mortar

Rockets generally look like a metal tube with the warhead at one end and stabilizing fins and rocket motor at the other end (see ***Figure 28***). Rockets can range from 1.5 inches to more than 15 inches in diameter and can vary from 1 foot to more than 9 feet in length. Rocket warheads contain explosives, toxic chemicals, white phosphorus, submunitions, riot-control agents, or illumination flares. Fuzes can be located in the nose of the rocket warhead or at the base of the warhead in front of the rocket motor. Both the warhead and residual propellant in the motor can cause injury or death.

8. Guided Missiles

Guided missiles differ from rockets in that guided missiles have internal electronics that direct the missile to its target while in flight. Spent (fired) guided missiles can still contain residual propellant that could ignite and burn violently. Many forces, such as pressure, radio and sound waves, and electrostatic and photoelectric energy, can activate guided missile fuzes. Guided missiles are extremely dangerous because they can contain fuzes that detonate even without human contact.

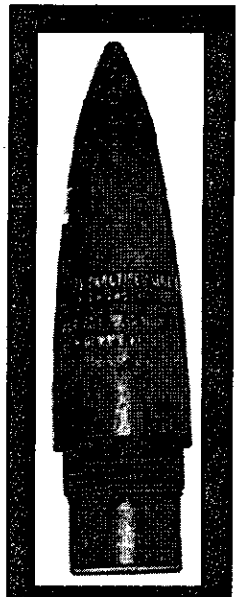


Figure 28 - Rocket, 2.75-inch practice.

9. Bombs

Bombs are considered to be dropped munitions. Bombs range from 1 pound to 3,000

Figure 29 - *Left and center: Practice bomb (BDU-33) and a cutaway of the bomb. This practice bomb is approximately 2 feet long. The central channel in the bomb contains an explosive spotting charge large enough to cause serious injury. (Note: Practice munitions are painted blue, but not all blue munitions are necessarily inert.) Right: Bomb found on public lands north of Chocolate Mountains Gunnery Range, California.*

(or more) pounds and from 2 to 10 feet in length. Newer bombs (e.g., smart bombs) can have a guidance device to guide the bomb to its intended target. Generally, all bombs have the same components: a metal container, a fuze, and a stabilizing device (see ***Figure 29***). The metal container, or bomb body, holds the explosive or chemical filler and may consist of one or more pieces. Bombs use either internal or external mechanical or electrical fuzes, which are typically located in the nose or tail section. Some type of arming vane generally arms mechanical fuzes. The arming vane operates like a propeller to line up all the fuze parts and arm the fuze. Fins or parachute assemblies attached to the rear section of the bomb stabilize it during flight. These assemblies often detach from the bomb after impact. As UXO, bombs may be broken into components (e.g., body components and a fuze) and may not appear to be bombs, but they remain hazardous.

10. Submunitions

Submunitions are multiple bomblets, grenades, or mines housed in a canister-like or artillery projectile delivery system. When activated, the delivery system (e.g., dispenser, missile or rocket warhead, or artillery projectile) releases the submunitions (see ***Figure 30***). The delivery system disperses the submunitions while still airborne, scattering the submunitions over a wide area. After dispersal, submunition fuzing systems activate in a variety of ways, including impact, pressure, time-delay, magnetic, or movement. Overall, submunitions are among the most dangerous UXO because they are small (as small as a 35 mm film canister), contain an explosive charge, do not look like military munitions, and are easily picked up.

11. Land Mines

Land mines are explosive munitions placed in or on the ground. Land mines detonate when the fuze is activated by pressure, when a trip wire is pulled, or in the presence of a magnetic field. Land mines are generally of two types: small antipersonnel mines and larger antitank mines (see ***Figure 31***). The only confirmed incidence of land mines on BLM-managed public lands

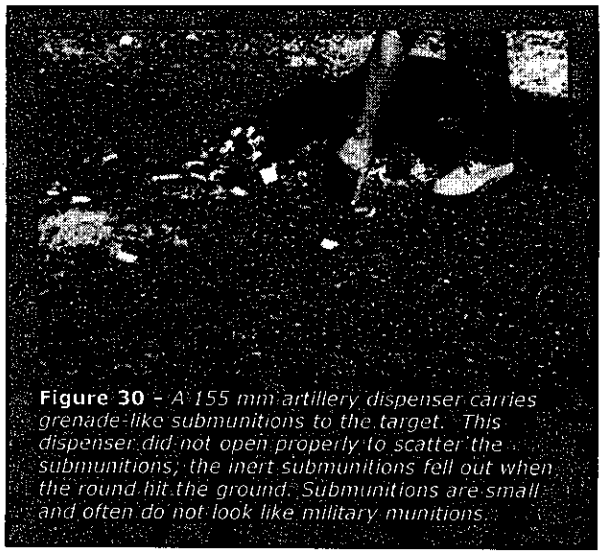


Figure 30 - *A 155 mm artillery dispenser carries grenade-like submunitions to the target. This dispenser did not open properly to scatter the submunitions; the inert submunitions fell out when the round hit the ground. Submunitions are small and often do not look like military munitions.*

were practice antitank mines in the California desert that were left over from training during World War II. The same type of practice antitank mines may also be located in southern Arizona and southern Nevada, where similar training took place. These practice antitank mines contain a spotting charge equivalent to the explosive force of a shotgun shell.

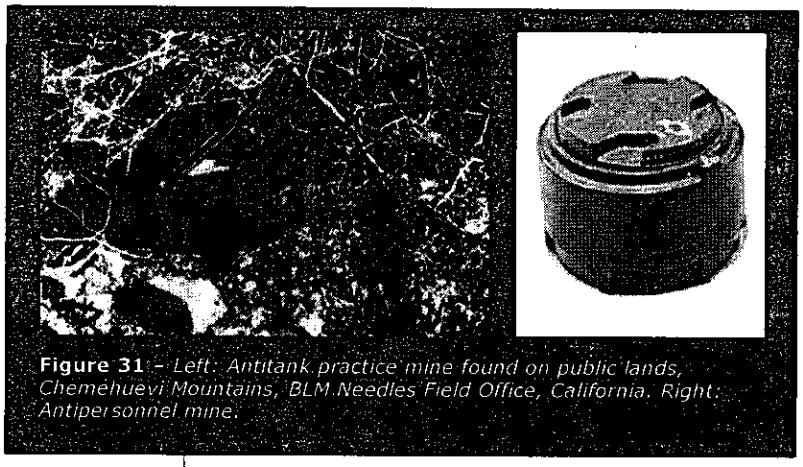


Figure 31 – *Left: Antitank practice mine found on public lands, Chemehuevi Mountains, BLM Needles Field Office, California. Right: Antipersonnel mine.*

The FWS had an active World War II-era antipersonnel and antitank minefield on Adak Island, but the Navy removed the tank and minefield as part of the BRAC cleanup. The FWS may have additional minefields on national wildlife refuges in the Pacific islands.

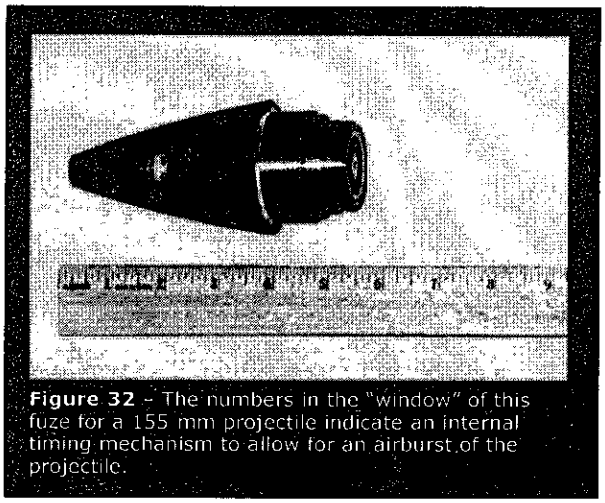


Figure 32 – The numbers in the "window" of this fuze for a 155 mm projectile indicate an internal timing mechanism to allow for an airburst of the projectile.

12. Flares

Flares may be either dropped or fired as a projectile. They normally consist of a magnesium compound that burns at very high temperatures; a fuze that initiates the burning process; and a canister that contains the magnesium compound, a fuze, and possibly a parachute. Flares as UXO will normally be found on or near the surface. The danger from a flare is both the fuze used to ignite the flare and the intense heat from the burning flare.

13. Fuzes

A fuze may be an integral part of a complete munition or a separate component that is attached to the remainder of the munition prior to firing (see ***Figure 32***). If a fuze fails to function properly, it will have undergone significant stress and may or may not still be attached to the munition. Fuzes come in a large variety of shapes and sizes and, therefore, are some of the most difficult MEC items to identify.

Appendix 2

Additional Information

Web Address	Sponsor	Synopsis
http://www.acq.osd.mil	Under Secretary of Defense for Acquisition and Technology	Provides updates for DoD technology-related activities
http://www.defenselink.mil	Department of Defense	Provides entrance into DoD web site; includes a search engine
http://www.denix.osd.mil	Defense Environmental Network and Information Exchange (DENIX)	Environmental legislation, compliance, restoration, cleanup, and DoD guidance
http://www.denix.osd.mil/ denix/Public/Library/ Explosives/UXOSafety /uxosafety.html	DENIX UXO Safety URL	UXO safety messages, posters, video clips, etc.
http://www.eglin.af.mil/ navscleod	Naval School Explosive Ordnance Disposal	Navy EOD web site
http://www.frtr.gov/resources.htm	Federal Remediation Technologies Roundtable	Agency explosives, ranges, and EOD-UXO links to other web sites with UXO information
http://www.fws.gov	U.S. Fish and Wildlife Service	FWS web site
http://www.dtic.mil	Defense Technical Information Center	Provides access to a forum for the exchange of scientific and technical information
http://www.epa.gov	Environmental Protection Agency	EPA's web site information regarding EPA activities, policies, and regulations
http://www.estcp.org	Environmental Security Technology Certification Program	Promotes environmental technologies through demonstration and validation
http://www.doi.gov	Department of the Interior	DOI web site
http://www.blm.gov	Bureau of Land Management	BLM web site
http://www.serdp.org	Strategic Environmental Research and Development Program	Latest news and events, and information regarding new cleanup technologies, including UXO
http://www.atsdr.cdc.gov/ toxfaq.html	Agency for Toxic Substances and Disease Registry	Fact sheets on various contaminants, including some explosive materials that may be found at hazardous waste sites

Appendix 3

Points of Contact (July 2005)

Bureau of Land Management	
Chief Ranger (BLM National Law Enforcement Office, Boise, ID)	(208) 387-5126
Protection and Response Group	(202) 557-3585
Lands and Realty	(202) 452-7773
BLM Safety Officer	(202) 501-2664
Military Liaison	(202) 452-7778
U.S. Fish and Wildlife Service	**(303) 984-6867**
Division of Engineering, Branch or Environmental and Facility Compliance	
Department of the Interior	
Office of Environmental Policy and Compliance	(202) 208-3891
DoD's Liaison to DOI	(202) 208-7211
Department of Defense	
DoD Explosives Safety Board, Chairman	(703) 325-0891

Appendix 4

Sample Liability Waiver

The following is an example of a waiver used at an installation that authorizes hunting and fishing in areas that may contain MEC. The recreational user must read or attend a safety briefing and sign this waiver before entering the property.

This is only a sample. Waivers must be approved by the regional solicitor or field solicitor that supports the local office.

CONDITION OF ENTRY AND LIABILITY WAIVER

I, the undersigned, hereby agree to observe all applicable regulations and circulars and all (State) Wildlife and Fish laws. I am fully aware that all activities are at my own risk, and in consideration for the permission to participate, I relieve the Government of all responsibility and liability for any damages or injuries that might occur.

I am fully aware that I may encounter hazards, including unexploded ordnance. I further agree not to enter any area except those that I have been authorized to enter. I will also follow the instructions provided for entry onto these lands. I certify that I have received a map and applicable regulations and/or instructions.

_____ _____

SIGNATURE DATE

_____

FULL ADDRESS INCLUDING ZIP CODE

Appendix 5

Site Safety and Health Plan

Instructions: Complete all blanks. If a response is not applicable, insert NA. Return to the Health and Safety Coordinator for review and approval.

Site Name:			
Prepared by:		Date	
Reviewed by:		Date	

A. INTRODUCTION

This health and safety plan establishes procedures and practices to protect employees and subcontractors from potential hazards posed by non-invasive field activities at the _____ site. In this health and safety plan, measures are provided to minimize potential exposure, accidents, and physical injuries that may occur during daily on-site activities and during normal working conditions. Contingencies are also provided for emergency situations. This plan should only be modified or amended by qualified BLM personnel or a contractor, assigned by BLM, qualified to make such modifications or amendments.

B. SITE DESCRIPTION

Site location or address:

Current site use:

Past site use:

Topography:

Name of and distance to nearest surface waters:

Surrounding land use and nearest population:

Site access [Provide directions to site]:

Nearest drinking water/sanitary facilities:

Nearest telephone:

Utilities located?

Site map attached?

C. PROJECT PERSONNEL

Role	Name	Training/Medical Monitoring Current? (Y/N)	Safety Briefing, Initials	Date
Team Leader				
Site Safety Officer				
Decontamination				
Sampler				

D. WORK PROPOSED

This plan was prepared for [describe specific tasks]:

Proposed work dates:

If visual inspection, will personnel be entering or contacting potentially hazardous areas? If yes, describe:

E. HAZARD EVALUATION AND ANALYSIS

Potentially hazardous agents known or suspected to be on-site (include preservatives and decontamination chemicals):

Substance	Concentration	Media	OSHA PEL	FP/LEL/VP	Odor Thresh	IP (ev)	Symptoms	First Aid
Heat	NA	NA	NA	NA	NA	NA	Flushed, hot or clammy skin, dizzy, nausea, disoriented	Provide water, electrolytes, rest, cool off in shade, sponge baths, seek medical attention

List any agents suspected to be at the site that cannot be detected by routine air monitoring equipment and plans made to detect them:

Potential chemical exposure routes [provide an "X"]:

Route	Known	Possible	Unlikely
Inhalation			
Ingestion			
Dermal			
Eye contact			

Chemical characteristics [provide an "X"]:

Hazard	Known	Possible	Unlikely
Toxic			
Ignitable			
Reactive			
Carcinogenic			
Volatile			
Radioactive			
Corrosive			
Particulate/fibers			

Possible physical hazards present during site investigation activities:

Hazard	Yes	No	Prevention
Terrain/tripping			
Heat/cold			
Electrical			
Drowning			
Falling objects			
Noise			
Venomous			
Other			

F. SITE CONTROL

Site control consists of measures taken to prevent human exposure to hazardous materials at the site. Such controls are defined as exclusion zones, contaminant reduction zones (CRZ), and support zone/ command post. If site control zones are needed for this site, they are shown on the attached map.

Site conditions and the work proposed under this plan (_____) do or do not require the establishment of exclusion zones that limit trained employee access. However, employees should minimize potential exposures and the raising of dust.

Regardless of the activities to be conducted, all site workers must use the buddy system, whereby each worker is paired with another worker or in communication (e.g., by radio under certain circumstances) with another worker. Under this system, each worker has the following responsibilities:

- Provide co-worker with assistance.
- Observe co-worker for evidence of chemical or heat exposure.
- Monitor the integrity of co-workers protective equipment.
- Notify the site safety officer or project manager if emergency help is needed.

G. CONFINED SPACES

A confined space is any space having limited means of egress that may be subject to the accumulation of toxic or flammable contaminants or an oxygen-deficient atmosphere. Confined spaces include tanks; process vessels; catch basins; boilers; bins; ducts; sewers; tunnels; pipelines; mine adits; and open-top spaces more than 4 ft deep, such as pits, vaults, and other vessels. **No confined spaces should be entered at the site for the work proposed under this plan.**

H. SPILL CONTAINMENT

No provisions are made within this plan for spill containment, as the information provided during the preparation of this plan did not identify any liquid wastes as being present at the site.

I. TASK DESCRIPTION AND PERSONAL PROTECTIVE EQUIPMENT

Based on the type of hazards identified in Section E, list the site tasks, level of protection, and protective clothing required for the each task:

Task	Level of Protection	Type of Coverall	Type of Bootie	Type of Glove

Only Level D tasks are approved for this site at this time. Workers performing these activities should minimize activities that raise dust. Level D: Safety boots, cotton clothing (no shorts). Upgrade may be to Tyvek or Saranex coveralls, safety glasses, surgical gloves, and overglove. **NOTE: Project personnel are not permitted to deviate from the specified level of protection without the prior approval of the site safety officer or BLM's health and safety officer.**

J. MEDICAL SURVEILLANCE

Employers are required by 29 CFR 1910.120 to provide a medical monitoring program for certain employees working with hazardous materials. The purpose of this program is to evaluate occupational exposures and to confirm that the employee is in satisfactory physical condition to wear the appropriate personal protective equipment. The employer must provide a medical surveillance program meeting the requirements of 29 CFR 1910.120 for the following personnel:

- All personnel who are or may be exposed to hazardous materials at or above the permissible exposure level at this and any other potential hazardous material site for more than 30 days a year regardless of the use of respiratory protection.
- Personnel who wear respirators more than 30 days a year.
- Personnel who develop injuries or symptoms of overexposure to hazardous substances.

The medical monitoring program must include the following elements:

- Physical examination prior to employment or assignment to a position necessitating contact with potentially hazardous materials.
- Yearly physical examination (the examination may be made at less frequent intervals at the direction of the physician).
- Physical examination at termination of employment or reassignment to a position that does not involve potential exposure to hazardous materials.
- Physical examination as soon as possible following an injury or the development of symptoms of overexposure to hazardous materials.

The medical examination must include the following elements:

- Determination and evaluation of the worker's employment and medical history.
- Description of the employee's duties.
- Estimate of the employee's potential exposure levels.
- Information from previous medical examinations, as needed.
- Diagnostic or analytical procedures as recommended by the physician.

The results of the medical surveillance program must be made available to the employee (including a written opinion from the physician regarding the fitness of the employee for the required task), and medical surveillance program records must be kept for the period of employment plus 30 years.

K. TRAINING

All employees working on-site that are exposed or potentially exposed to hazardous substances or general health and safety hazards shall receive training meeting the requirements of 29 CFR 1910.120 (e)(1) through (9), as appropriate. This includes the minimum 40-hour training for general site workers and additional 8-hour training for supervisors.

L. SAFETY EQUIPMENT

The following safety equipment will be on-site during the field investigation: first aid kit, eyewash, fire extinguisher, and wind tape.

M. AIR MONITORING

The following equipment will be used to monitor air quality in the breathing zone during work activities:

Instruments	Calibration	Parameter	Frequency
Dataram	None	Particulates	Continuous
Multirae	Daily per manual	Vapors/gases	Continuous
Multirae	Factory	O_2, combustible gas, H_2S	Varies
Monitor 4	Factory	Radiation	Varies
Detector tubes	None	Numerous; chemical-specific	Varies

If air contaminants are detected, continuous monitoring shall be employed. The following action levels have been established to determine the appropriate level of personal protection to be used during site investigation activities:

Hazard	Action Level	Action	Instrument
Particulates	> 5.0 mg/m^3	Vacate site	Dataram
Organic vapor	> 1 ppm[a]	Vacate site	Multirae
Detector tubes	> PEL	Vacate site	Draeger
Gamma radiation	> 2mrem/hr[b]	Vacate site	Survey instrument
Combustible gas/ O_2 level	> 20% LEL < 19.5%	Vacate hazard area	Multirae

[a] Above background in breathing zone
[b] Milliroentgen equivalent in man per hour
Comments: Assumes lead constitutes 1% of airborne dust. Background radiation is normally 0.01-0.02 mrem/hr.

Note: Source for radiation hazard information: *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, prepared by NIOSH/OSHA/USCG/EPA. 1985.

N. DECONTAMINATION

To prevent the distribution of contaminants outside the exclusion zone and to prevent cross-contamination, the following procedures will be used to decontaminate equipment: Dismantle to expose hidden contamination, wash with soap and water in a wash tub, rinse with water, rinse with clean water, and place equipment in a clean plastic bag. More delicate equipment or surfaces should be decontaminated by wiping with a clean, moist cloth. To prevent the distribution of contaminants outside the exclusion zone and to prevent personal exposure to chemicals, VEHICLES WILL NOT BE ALLOWED INSIDE THE EXCLUSION ZONE.

To minimize or prevent personal exposure to hazardous materials, all personnel working in the exclusion zone and contamination reduction zones will comply with the following decontamination procedures: Wash boots, rinse boots, remove duct tape (if used), remove coveralls, remove gloves. Decontamination may not be necessary if site control zones have not been identified and soils are not wet.

Decontamination equipment required on-site will include: Wash and rinse tubs, brushes, water storage, alconox. Decontamination wastewater and contaminated materials will be disposed of in the following manner: decontaminated PPE is expected to be of low hazard and should be placed in plastic bags for disposal at a landfill. Soapy water may be discharged on the ground.

O. SHIPMENT OF RESTRICTED ARTICLES

Federal laws and international guidelines place restrictions on certain materials shipped by passenger and cargo aircraft. No shipping of restricted materials is expected for the work proposed under this safety plan. This section may require revision in the future if the scope of work is modified (for example, to include shipment of environmental samples).

P. EMERGENCY RESPONSE PLAN

The site safety officer (SSO) is responsible for implementing this aspect of the plan. He will decide when to evacuate the site and notify local resources listed below. He will be alert for symptoms of chemical or heat exposure as listed in Section E. The SSO will maintain the first aid kit. He or other members of the team will provide decontamination and first aid in accordance with Section E (if needed) and immediately transport injured persons to the hospital.

Local Resources	Name	Telephone
Fire		
Police		
Ambulance		
Hospital		
Site phone		

Directions to the hospital: See attached map. [Provide directions]

[Hint: Try Mapquest.com]

BLM and other resources:

	Name/Location	Work Phone	Home Phone
Site Health and Safety Officer			
Health and Safety Coordinator			
Medical Consultant			

Q. DOCUMENTATION

Document	Attached (Y/N)	In File (Y/N)
Hospital Route Map		
Site Map		
Work Plan		
Material Safety Data Sheets		
Training Records		
Medical Clearance		
Equipment SOPs		
General Work Practices		
Accident Report Form		
Health and Safety Plan		

R. EQUIPMENT LIST

A. Health and Safety ___ Organic vapor detector ___ Dataram ___ Explosimeter ___ Oxygen level indicator ___ Radiation meter ___ Detector tubes ___ Other ___ Tyvek suits number ( ) ___ Saranex suits ( ) ___ Nitrile gloves ( ) ___ Surgical gloves ___ Booties ( ) ___ Hardhats ___ Safety boots ___ Respirators ___ Duct tape ___ Cell phone/radio ___ First aid kit ___ Eyewash ___ Vehicle fire extinguisher ___ ___ ___	C. Basic Sampling Equipment ___ Hand auger; number of auger heads: ___ Stainless steel bailer ___ Teflon bailer ___ Plastic scoop ___ Rope for bailer; feet ( ) ___ Shovel ___ Stainless steel spoons ( ) ___ Disposable plastic spoons ___ Ziploc bags ___ Sample bottles (number and type) ___ Preservatives ___ Water filtering apparatus ___ Disposable bags ___ Ice ___ Coolers ( ) ___ Strapping tape ___ Air bills ___ 100 ft. measuring tape ___ pH, temperature, conductance kit ___ Soil pH tester ___ Water level indicator ___ X-ray fluorescence (XRF)/field screening kits ___ Pin flags ___ Global Positioning System (GPS) unit
B. Decontamination ___ Alconox (detergent) ___ Decontamination tubs (2 minimum) ___ Brushes (bailer type) ___ Brushes (dairy type) ___ Brushes (auger type) ___ 10 gal tap water ___ Methanol (optional) ___ Squirt bottles (optional) ___ Foil ___ Garbage bags ___ Distilled water	D. Documentation ___ Field logbook ___ Chain-of-custody forms ___ Sample tags ___ Custody seals ___ Camera ___ Film ___ Wristwatch ___ ___ ___ ___

DECLARATION OF SERVICE
Blythe Solar Power Plant Project

Docket No. 09-AFC-6

I, Bonnie Heeley, declare that on June 15, 2010, I served and filed copies of the attached **EXHIBITS ON BEHALF OF CALIFORNIA UNIONS FOR RELIABLE ENERGY FOR THE BLYTHE SOLAR POWER PROJECT**. The original document, filed with the Docket Office, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/solar_millennium_blythe/index.html.

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Office via OVERNIGHT MAIL as addressed below:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct. Executed at South San Francisco, California on June 15, 2010.

Bonnie Heeley

CALIFORNIA ENERGY COMMISSION Attn: Docket No. 09AFC6 1516 Ninth Street, MS4 Sacramento, CA 95814-5512 docket@energy.state.ca.us	Alice Harron Senior Director-Project Dvlpmnt 1625 Shattuck Ave., #270 Berkeley, CA 94709-1161 harron@solarmillennium.com	Elizabeth Ingram, Associate Dvlpr Solar Millennium, LLC 1625 Shattuck Avenue Berkeley, CA 94709 ingram@solarmillennium.com
Carl Lindner AECOM Project Manager 1220 Avenida Acaso Camarillo, CA 93012 Carl.lindner@aecom.com	Scott Galati, Esq. Galati/Blek, LLP 455 Capitol Mall, #350 Sacramento, CA 95814 sgalati@gb-llp.com	Peter Weiner/Matthew Sanders Paul Hastings Janofsky & Walker LLP 55 2nd Street, #2400-3441 San Francisco, CA 94105 peterweiner@paulhastings.com matthewsanders@paulhastings.com

California ISO e-recipient@caiso.com VIA EMAIL ONLY	Holly L. Roberts, Project Mngr Bureau of Land Management Palm Springs-So. Coast Field Off. 1201 Bird Center Drive Palm Springs, CA 92262 CAPSSolarBlythe@blm.gov	California Unions for Reliable Energy E. Klebaner / T.Gulesserain / MDJoseph Adams Broadwell Joseph & Cardozo 601 Gateway Blvd., #1000 South San Francisco, CA 94080 tgulesserian@adamsbroadwell.com eklebaner@adamsbroadwell.com
Karen Douglas Chairman/Presiding Member California Energy Commission 1516 Ninth Street Sacramento, CA 95814 kldougla@energy.state.ca.us	Robert Weisenmiller Commissioner-Assoc. Member California Energy Commission 1516 Ninth Street Sacramento, CA 95814 rweisenm@energy.state.ca.us	Raoul Renaud Hearing Officer California Energy Commission 1516 Ninth Street Sacramento, CA 95814 rrenaud@energy.state.ca.us
Alan Solomon Siting Project Manager California Energy Commission 1516 Ninth Street Sacramento, CA 95814 asolomon@energy.state.ca.us	Lisa DeCarlo, Staff Counsel California Energy Commission 1516 Ninth Street Sacramento, CA 95814 ldecarlo@energy.state.ca.us	Jennifer Jennings Public Adviser's Office California Energy Commission 1516 Ninth Street Sacramento, CA 95814 publicadviser@energy.state.ca.us
Ram Ambatipudi Chevron Energy Solutions 150 E. Colorado Blvd., Ste. 360 Pasadena, CA 91105 rambatipudi@chevron.com		