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Subject: **HYUNDAI MOTOR AMERICA MOJAVE PROVING GROUNDS DESERT TORTOISE TRANSLOCATION STUDY 2006 ANNUAL SUMMARY**
PALEN SOLAR POWER PROJECT
DOCKET NO. (09-AFC-7)

Enclosed for filing with the California Energy Commission is the original of **HYUNDAI MOTOR AMERICA MOJAVE PROVING GROUNDS DESERT TORTOISE TRANSLOCATION STUDY 2006 ANNUAL SUMMARY** for the Palen Solar Power Project (09-AFC-7).

Sincerely,

Marie Mills

HYUNDAI MOTOR AMERICA MOJAVE PROVING GROUNDS DESERT TORTOISE TRANSLOCATION STUDY

2006 ANNUAL SUMMARY

Prepared For:

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March 2007

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BACKGROUND

The Habitat Conservation Plan (HCP) for the Hyundai Motor America (Hyundai) Mojave Proving Grounds Project (Project)[1] detailed the methods and requirements for a translocation program on desert tortoises (*Gopherus agassizii*) removed from the Hyundai Project site[2]. The program included both translocation of tortoises from the Hyundai Project site and a follow-up study on specific effects of translocation.

The primary goals of translocating tortoises from the Hyundai site were to prevent the mortality of tortoises that lived on the site, to maintain the integrity of the population as much as possible, and to maintain breeding individuals in the population. Secondarily, it was hoped that translocation would facilitate the repopulation of another nearby area that had experienced tortoise density declines resulting from drought and disease, and were thereby well under carrying capacity in a normal forage year.

The primary objectives of the translocation study were to address four primary questions:

1 – What is the effect of translocation on survival?
2 – What is the effect of translocation on health status, especially (a) exposure to *Mycoplasma. agassizii* and other pathogens, (b) disease expression, and (c) condition indices?
3 – Is fencing a translocation site a reasonable procedure for site repatriation of areas that are depauperate due to stochastic climatic events or other factors that have not reduced the habitat quality at the translocation site?
4 – How are activity levels affected by translocation?

Each question was further segregated into effects relating to gender, age/size, variation in forage levels, rehydration, activity levels, and time since translocation.

Desert tortoises were removed from the proving grounds and translocated to one of two translocation sites in April of 2004 and 2005 (see attached summaries for the details of each translocation effort). The sites were fenced with tortoise-proof fencing that would removed after at least 18 months to investigate the repatriation objective

[1] Sapphos Environmental, Inc. 2004. Environmental Assessment/Habitat Conservation Plan for issuance of an engangered species Section 10(A)1(B) Permit for the incidental take of the desert tortoise (*Gopherus agassizii*). January 6, 2004.
[2] Karl, A. E. 2003. Hyundai Motor America Mojave Test Track Site. Desert tortoise translocation program. Appendix A of Sapphos Environmental, Inc,. 2004, Environmental Assessment/Habitat Conservation Plan for issuance of an endangered species Section 10(A)1(B) Permit for the incidental take of the desert tortoise (*Gopherus agassizii*).

of the project. Studies began on the translocated tortoises prior to their translocation, in October 2003, and have been continuous since.

This report summarizes activities in 2006. Data analyses are preliminary and ultimately will be incorporated into comprehensive analyses for each subject area. Such analyses are continually underway for several of the multi-year activities and will become available as results reach a logical threshold.

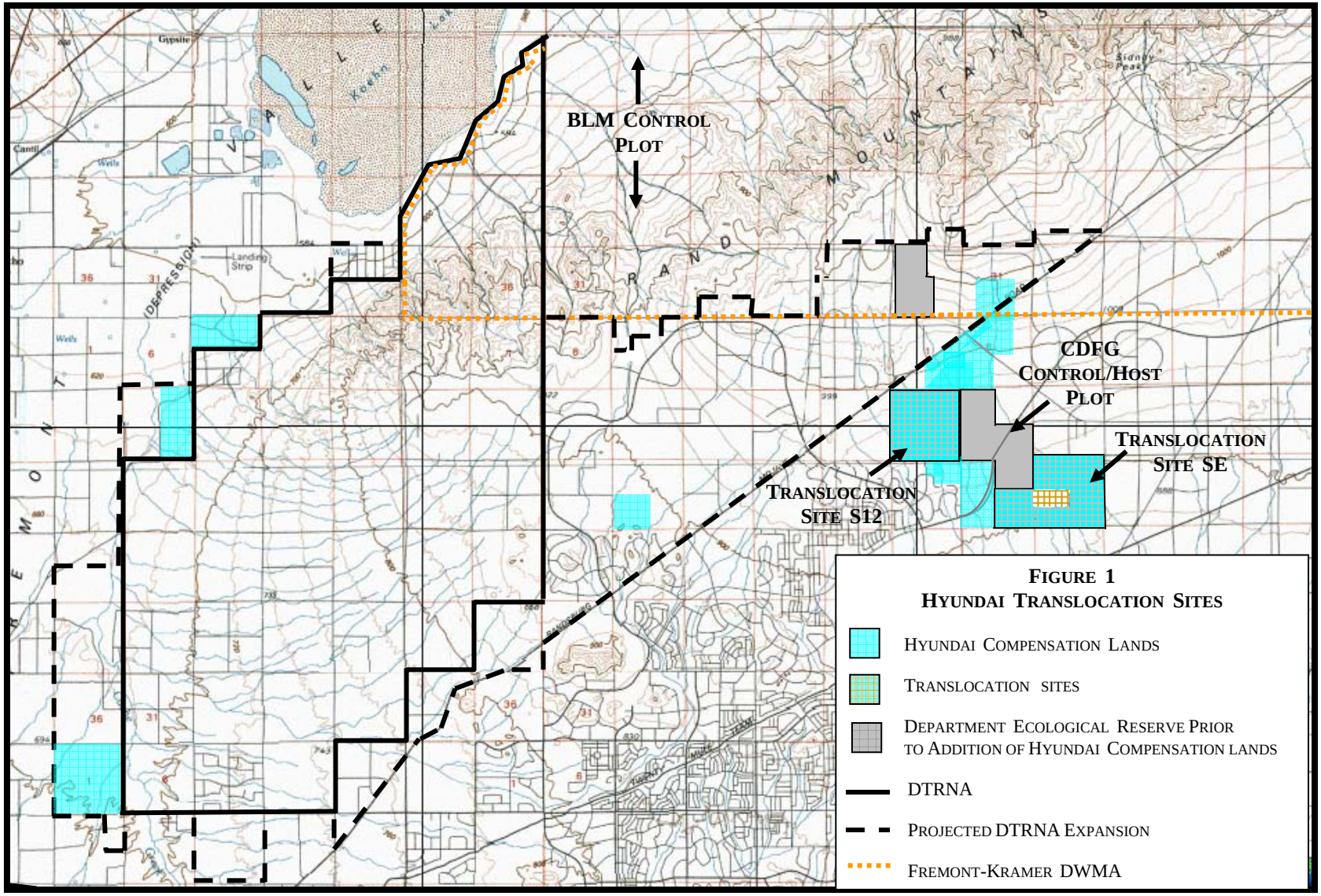
SITE DESCRIPTION

Based on requirements of the HCP, two translocation sites were established. Site choice was based on habitat quality, carrying capacity considerations, size and proximity to other protected (or likely to be protected) lands, proximity to the Hyundai Project site (i.e., same tortoise population), and ability to protect the site in perpetuity. (See Karl [2003][1] for discussions of these considerations).

The two translocation sites are approximately 30 km northeast of the Hyundai Proving Grounds and adjacent to previously existing lands in the California Department of Fish and Game Ecological Reserve (CDFG ER; Figure 1). They have subsequently become part of that reserve as part of Hyundai Project compensation. The translocation sites are also adjacent to the expansion boundary of another neighboring reserve, the Desert Tortoise Research Natural Area (DTRNA), and the Fremont-Kramer Desert Wildlife Management Area (DWMA).

The westernmost translocation site ("Translocation S12") is one square mile and occupies Section 12 in Township 31S and Range 39E. The eastern translocation site ("Translocation SE") is 1.25 square miles and encompasses Section 17 and the southeastern quarter of Section 18 in Township 31S and Range 40E. Both sites were fenced with wire mesh field fencing prior to translocating tortoises there, in order to preclude entry by sheep and recreationists. Three-foot-wide, tortoise-proof hardware cloth was attached to the lower portion of the fence, with two feet extending above the ground surface and the remaining foot buried, to temporarily keep translocated tortoises in the translocation site.

The sites have inherently medium quality habitat, based on shrub and annual species present, vegetation density, topography, soils, and substrates. The shrub community is dominated by creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and goldenhead (*Acamptopappus sphaerocephalus*), and snake head (*Ericameria cooperi*), with subdominant cheesebush (*Ambrosia salsola*), winterfat (*Krachenninnikovia lanata*), Mojave aster (*Xylorhiza tortifolia*), stipa (*Stipa speciosa*), and wolfberry (*Lycium cooperi*). The topography is flat to very gently undulating and soils are soft loamy sands. Sheep grazing during the historic past has decreased the habitat quality somewhat by reducing the diversity of shrubs and potentially promoting the dominance of two exotic annuals, split grass (*Schismus*


BLM CONTROL PLOT
CDFG CONTROL/HOST PLOT
TRANSLOCATION SITE SE
TRANSLOCATION SITE S12
FIGURE 1
HYUNDAI TRANSLOCATION SITES
HYUNDAI COMPENSATION LANDS
TRANSLOCATION SITES
DEPARTMENT ECOLOGICAL RESERVE PRIOR TO ADDITION OF HYUNDAI COMPENSATION LANDS
DTRNA
PROJECTED DTRNA EXPANSION
FREMONT-KRAMER DWMA

arabicus) and filaree (*Erodium cicutarium*). There are, however, a number of native species present that are consumed by tortoises (in addition to consuming the split grass and filaree). Onsite disturbances consist of a few well-developed off-highway-vehicle (OHV) trails (motorcycle and all-terrain vehicle) and scattered tracks and faint trails. There are no OHV "play" areas of concentrated damage, although there are a couple of old sheep bedding areas on Translocation SE.

METHODS

Study Cohorts

Hyundai tortoises were translocated to the two translocated sites in April 2004 (Translocation S12) and April 2005 (Translocation SE), because of staggered site availability. (One tortoises, H15, was left outside the Hyundai Project site because she was seropositive for exposure to *Mycoplasma agassizii*.) Both sites were searched for host tortoises prior to releasing translocated tortoises there. However, host tortoises were only found on Translocation SE; none was found in Translocation S12. In March and April 2004, a control site ("BLM Control") was established north of the Rand Mountains (Figure 1) and the site was searched for resident tortoises. A secondary area abutting and between the two translocation sites, and affected both by the initial tortoise-proof fencing as well as the ultimate influx of new tortoises following removal of that fencing ("CDFG Control/Host"), was also searched for resident tortoises. In March and April 2005, the Translocation SE site was searched for host tortoises prior to translocating the remaining Hyundai tortoises there. In summary, the study cohorts consist of:

- ◊ Two translocation cohorts:
  - Translocation S12 - 15 tortoises
  - Translocation SE - 12 tortoises
- ◊ Translocation SE Host Tortoises- 9 tortoises
- ◊ CDFG Control/Host Tortoises - 6 tortoises
- ◊ BLM Control Tortoises - 22 tortoises
- ◊ Hyundai Site (Outside Fence) Tortoises – 1 tortoise

Table 1 describes the size and gender composition of each cohort.

General Methods

At the time of capture, all study tortoises (translocatees, host, and control tortoises) were weighed, measured, photographed, sexed, and described. To facilitate future identification, each was permanently marked (notched) with a unique number, including a distinctive notch to distinguish these tortoises from those used in other nearby studies (e.g., DTRNA trend plots), and secondarily marked with a small epoxy

Table 1
Hyundai Desert Tortoise Translocation Project
Initial Composition of All Study Cohorts, by Site

Tortoise Number	Gender	MCL[1]
Translocated Tortoises-Translocation S12		
H 04	Male	299.5
H 07	Male	272
H 08	Female	280
H 14	Male	313.5
H 16	Female	241
H 18	Male	286
H 21	Female	244
H 23	Female	254
H 24	Female	243
H 25	Female	251
H 26	Female	227
H 28	Male	288
H 31	Female	248
H 34	Male	261
H120	Male	267
Translocated Tortoises-Translocation SE		
H 05	Male	282
H 06	Male	299
H 17	Female	260
H 19	Female	247
H 22	Female	255*
H 27	Female	276
H 29	Male	277
H 32	Male	234
H 35	Male	285
H 36	Male	278
H 37	Female	239
H 40	Female	290
Hyundai Site (Outside Fence)		
H 15	Female	248

Tortoise Number	Gender	MCL[1]
BLM Control		
H 101	Female	235
H 102	Female	222
H 103	Male	299
H 104	Male	217
H 105	Male	180
H 106	Female	243.5
H 107	Female	238
H 108	Male	263.5
H 109	Female	244
H 110	Male	184.5
H 111	Female	249
H 112	Male	283
H 113	Female	198
H 114	Male	290
H 115	Female	221
H 116	Male	258
H 117	Male	251
H 118	Male	268
H 119	Male	264
H 121	Male	273
H 130	Female	241.5
H 407	Male	230
CDFG Control/Host		
H 201	Male	246
H 202	Male	285
H 203	Male	296
H 204	Female	255
H 205	Male	254+
H 212[2]	Male	209
Translocation SE Host		
H 206	Female	259
H 207	Male	277
H 209	Male	297
H 210	Female	235
H 211	Female	247
H 213	Male	256
H 214	Female	245
H 215	Female	224
H 217	Male	303

1. Maximum Carapace Length at initial capture
2. H212 moved several kilometers away from the study site, so was removed from the Study cohort.

number on the fourth costal. Holohil R1-2B transmitters (24mm wide by 11 mm thick; 14.9 g) were attached to each tortoise, fitted to insure safety to the individual and lack of interference with growth and behaviors (Figure 2). Transmitters are scheduled to last 18or 24 months and are changed prior to scheduled battery life or sooner, if they exhibit symptoms of malfunctioning.

Figure 2. Standard transmitter placement on male Hyundai study tortoises (here, H203). Note the data logger attached to the pygal scute on the left side of the photo.

Survival and general health are monitored through body condition indices (mass to volume ratios[3]), clinical signs, serology and cultures. Condition indices are measured three times during each year: (1) when tortoises exit from hibernation (late March),; (2) following the

[3] Volume is calculated as half the volume of a spheroid, or $\frac{1}{2}(4/3 \cdot \pi \cdot r^3)$. For a tortoise, this translates into $\frac{1}{2}$ [$4/3 \cdot \pi \cdot$(length/2)·(width/2)·height].

spring activity period and after nesting (July); and (3) immediately prior to hibernation (late October). All tortoises are examined for clinical signs of disease while measuring condition indices. Serum and nasal samples were taken for all study animals at initial capture and at translocation, and are collected annually to test for the presence of antibodies to *Mycoplasma agassizii* (ELISA test) or *M. agassizii* infection (PCR culture), respectively.

Activity patterns (i.e. increased aboveground activity levels), which may affect body temperatures and body condition and ultimately health and survival, are monitored by temperature data loggers (HOBO© TidBits [(www.onsetcomp.com)]), which continuously collect data, every ten minutes. These have been mounted on all males in the study cohorts and also in sample burrows. (Only males can carry the data loggers without interference with righting or copulatory behaviors because the data loggers' tall profile necessitates that the unit be attached to the pygal scute. See Figure 2.)

Translocated tortoises are located on a sufficiently intense schedule to collect the necessary health data, download data loggers, change transmitters, identify faulty transmitters and other equipment, and monitor coarse-grained use areas. In general, this includes locations every ten days during the height of the spring activity period (April), twice-monthly locations during the remainder of the spring activity period (May through June) and fall activity period (October), and once a month in all other months. The exception to this schedule was immediately following translocation. All tortoises were watched for at least one full day immediately following release to observe behaviors and insure that no tortoise exhibited behavior that could compromise survival.

Vegetation data have been collected annually for comparison among all sites, including the original capture site (Hyundai Proving Grounds). Comparisons include plant community characterization (density, frequency, species composition, and percent cover) as well as forage cover and biomass. Specific methods will be presented during a separate report on vegetation results.

Weather is monitored continuously using an HOBO© Weather Station (www.onsetcomp.com) on the Translocation S12 site. Precipitation, wind speed, relative humidity, air temperature, surface temperature, and barometric pressure are recorded hourly. A rain gauge is also maintained on the Hyundai Project site to record precipitation there.

Year 2006

In July 2005, the tortoise-proof fabric at the Translocation S12 site was removed. Because of the possibility of extreme tortoise movements after release, especially following the July 2005 monsoons, translocated tortoises in the Translocation S12 cohort were located three times a week until early September, at which point there was some confidence that they would not be lost due to extreme movements. (Control tortoises were located weekly for comparability of movement.) Rates of locating tortoises remained elevated over normal autumn rates until hibernation, but only at approximately every ten days rather than three times a week.

RESULTS FOR YEAR 2006

Survival

No tortoises died in 2006. To date, only two tortoises in the study group have died, Translocated Male H120 and Host SE Female H215. There was no obvious cause of death for Tortoise H120, who was a relatively old male, judging from shell wear. The female, who died approximately June 1, 2005, apparently died of exposure due to being overturned on a hard surface, where she was unable to right herself prior to overheating.

Health Analyses

Laboratory Results. Titer levels of antibodies identify exposure to *M. agassizii*. No tortoises translocated from Hyundai have seroconverted (i.e., became positive for exposure to *M. agassizii*). Four tortoises have changed titers over the study period: BLM Control tortoises H106, H112 and H119, and the tortoise remaining outside the Proving Grounds, H15. H106 had a titer level of <32 and considered negative for exposure to *M. agassizii* at capture in April of 2004[4]. In April of 2005, this tortoise had a titer level of 32 and was suspect for exposure. In July 2006, the titer was once again <32**.** H112 had a titer level of 128 at capture in April 2004. In 2005, the titer level was 64 and the tortoise was still considered positive for exposure to *M. agassizii*. In July 2006, the titer level was 32 and the tortoise was considered suspect for exposure. Tortoise H119 was consistently negative through two samplings (April and October) in 2004, with a titer level of <32. In July 2005 and in subsequent samples, the titer level was 32, suggesting a possible exposure to *M. agassizii*.

Tortoise H15, a female from the Hyundai Project site that moved outside the fence prior to the translocation effort and has been monitored as a study animal where she remains, has been continually seropositive since her capture in October 2003. Her titer was 128 from 2003 through 2005. In 2006, the level was 64. Clinical signs have been variable on this tortoise but generally have been confined to swollen eyelids, especially the palpebral. She has never exhibited a nasal discharge or other secretions that are consistent with mycoplasmosis, Other inconsistent signs that may be considered clinical indicators of mycoplasmosis have included occasionally moist nares, moist eyes, or dirt in the nares. However, these conditions are not uncommonly observed in seronegative tortoises and are most likely a response to living in a subterranean, dirt burrow.

Cultures have been consistently negative for all tortoises, even those with positive or suspect titer levels. This is not considered unusual because of the difficulties of culturing the microorganism (Lori Wendland, DVM, University of Florida Mycoplasma lab, pers. comm.).

[4] The University of Florida Mycoplasma lab rates tortoises as positive, suspect, or negative for exposure, based on titer levels. A titer of 32 is the threshold.

Table 2
Hyundai Desert Tortoise Translocation Project
Comparative Laboratory Results for *Mycoplasma agassizii* Exposure and/or Infection
From Initial Capture and Year 2006

Tortoise	Condition at Initial Capture			Condition in 2006		
	Titer	ELISA Result	PCR Result	Titer	ELISA Result	PCR Result[1]
Translocated Tortoises-Translocation S12						
H 04	<32	Negative	Negative	<32	Negative[2]	Negative
H 07	<32	Negative	Negative	<32	Negative	Negative
H 08	<32	Negative	Negative	<32	Negative	--- [1]
H 14	<32	Negative	Negative	<32	Negative	--- [1]
H 16	<32	Negative	Negative	<32	Negative	--- [1]
H 18	<32	Negative	Negative	<32	Negative	Negative
H 21	<32	Negative	Negative	<32	Negative	--- [1]
H 23	<32	Negative	Negative	<32	Negative	--- [1]
H 24	<32	Negative	Negative	<32	Negative[2]	--- [1]
H 25	<32	Negative	Negative	<32	Negative[2]	--- [1]
H 26	<32	Negative	Negative	<32	Negative	--- [1]
H 28	<32	Negative	Negative	<32	Negative[2]	Negative
H 31	<32	Negative	Negative	<32	Negative	Negative
H 34	<32	Negative	Negative	<32	Negative	Negative
H 120	<32	Negative	Negative	<32	Negative[3]	Negative
Translocated Tortoises-Translocation SE						
H 05	<32	Negative	Negative	<32	Negative	--- [1]
H 06	<32	Negative	Negative	<32	Negative	Negative
H 17	<32	Negative	Negative	<32	Negative	--- [1]
H 19	<32	Negative	Negative	<32	Negative	Negative
H 22	<32	Negative	Negative	<32	Negative	Negative
H 27	<32	Negative	Negative	<32	Negative	--- [1]
H 29	<32	Negative	Negative	<32	Negative	Negative
H 32	<32	Negative	Negative	<32	Negative	Negative
H 35	<32	Negative	Negative	--- [5]	--- [5]	--- [1]
H 36	<32	Negative	Negative	<32	Negative	Negative
H 37	<32	Negative	Negative	<32	Negative	--- [1]
H 40	<32	Negative	Negative	<32	Negative	--- [1]
Translocation SE Host						
H 206	<32	Negative	Negative	<32	Negative	Negative
H 207	<32	Negative	Negative	<32	Negative	Negative
H 209	<32	Negative	Negative	<32	Negative	Negative
H 210	<32	Negative	Negative	<32	Negative	Negative
H 211	<32	Negative	Negative	<32	Negative	Negative
H 213	<32	Negative	Negative	<32	Negative	Negative
H 214	<32	Negative	Negative	<32	Negative	Negative
H 215	<32	Negative	Negative	<32	Negative[3]	Negative

H 217	<32	Negative	--- (1)	<32	Negative	--- [1]
BLM Control						
H 101	<32	Negative	Negative	Tortoise is temporarily lost		
H 102	<32	Negative	Negative	<32	Negative	Negative
H 103	<32	Negative	Negative	<32	Negative	Negative
H 104	<32	Negative	Negative	<32	Negative	Negative
H 105	<32	Negative	Negative	<32	Negative	Negative
H 106	<32	Negative	Negative	<32	Negative	Negative
H 107	<32	Negative	Negative	<32	Negative	Negative
H 108	<32	Negative	Negative	<32	Negative	Negative
H 109	<32	Negative	Negative	<32	Negative	Negative
H 110	<32	Negative	Negative	<32	Negative	Negative
H 111	<32	Negative	Negative	<32	Negative	Negative
H 112	128	**POSITIVE**	Negative	32	**SUSPECT**	Negative
H 113	<32	Negative	Negative	<32	Negative	Negative
H 114	<32	Negative	Negative	<32	Negative	Negative
H 115	<32	Negative	Negative	<32	Negative	Negative
H 116	<32	Negative	Negative	<32	Negative	Negative
H 117	<32	Negative	Negative	<32	Negative	Negative
H 118	<32	Negative	Negative	<32	Negative	Negative
H 119	<32	Negative	Negative	32	**SUSPECT**	Negative
H 121	<32	Negative	Negative	<32	Negative	Negative
H 130	<32	Negative	Negative	<32	Negative	Negative
H 407	<32	Negative	Negative	<32	Negative	Negative
CDFG Control/Host						
H 201	<32	Negative	Negative	<32	Negative	--- [4]
H 202	<32	Negative	Negative	Tortoise is temporarily lost		--- [4]
H 203	<32	Negative	Negative	<32	Negative	Negative
H 204	<32	Negative	Negative	--- [5]	--- [5]	Negative
H 205	<32	Negative	Negative	--- [5]	--- [5]	Negative
Hyundai Site (Outside)						
H 15	128	**POSITIVE**	Negative	64	**POSITIVE**	Negative

1 PCR cultures not yet completed by University of Florida for Year 2006. Year 2005 shown if available. (Some 2005 results have not been supplied by the University of Florida yet.).

2 Unable to extract tortoise on any sampling occasion in 2006. Results shown are from July or October 2005.

3 Tortoise died in 2005. Results shown are from 2005

4. Tortoise lost in 2005 due to early transmitter failure. (Note: AVM Instruments transmitters were used on a portion of the study group initially, but due to untimely transmitter failure and poor operation, they were all replaced with Holohil transmitters. Some tortoises wearing AVMs were temporarily lost, but re-found through extensive and repeated searches.)

5. ELISA results currently unavailable

Hence, although a negative result does not signal absence, a positive result is definitive for presence of *M. agassizii*.

Condition Indices. Condtion indices for translocated tortoises were similar to both control and host tortoises (Table 3), for both genders, and there is no apparent loss of body mass at one or two years post-translocation that is due to translocation. Females in 2006 emerged from hibernation in slightly better condition than males (although not significant: $P_{1,49} = 0.28$), but following the spring oviposition period, had significantly lower condition indices ($P_{1,49} < 0.001$). These lower condition indices remained into hibernation ($P_{1,49} = 0.009$).

Table 3
Hyundai Desert Tortoise Translocation Project
Comparative Condition Indices ($g/m^3 * 10^{-3}$) for Translocated, Control, and Host Tortoises in Year 2006

Cohort	April		July		October	
	Female	Male	Female	Male	Female	Male
Translocated Tortoises (both sites)	1.146	1.145	0.942	1.049	0.818	0.980
BLM Control	1.157	1.114	0.946	1.051	0.880	0.931
Host Tortoises (CDFG, Translocation SE)	1.158	1.122	0.931	1.064	0.947	0.987

Tortoise Movement Following Fence Removal

The tortoise fence was detached from the perimeter fence on the first translocation site (Translocation S12) and removed during July 2006. This was 27 months after tortoises had been translocated to that site. It was also prior to the autumn period of high tortoise activity. During the period between fence removal and hibernation, only three tortoises moved off the site. Two of these, Female H24 and Male H04 moved less than 100 meters off the translocation site and then moved back onto the site. H24 finally hibernated less than 50 meters off the site. Female H21 remained on the site until October, when she moved approximately 40 meters off site. She ultimately

hibernated approximately 220 meters north of the site. The remaining 12 translocated tortoises remained on the translocation site.

Autumn 2006 followed late June precipitation (1.8 mm) and was accompanied by early October precipitation (2.4 mm), with the resultant germination of several forage species. In addition to normal elevated testosterone levels in the fall, these environmental conditions promoted activity and thereby heightened the opportunity for tortoises to leave the site of translocation. The result that only two tortoises moved a very short distance off the site suggests that, at least in the short term, repatriation of the site is a success. The remaining two years of the study will identify further movement patterns and provide more information on the value of this repatriation technique for re-populating depauperate areas.

CONTINUED STUDIES

The tortoise fence from the second translocation site (Translocation SE) was removed during Winter 2006/7, 22 months following translocation. Tortoises will emerge from hibernation without the constraints of a border fence. Intensive monitoring has begun to help insure that tortoises will not be lost should they move substantial distances. Based on the lack of movement away from the translocation site for the first set of tortoises released (Translocation S12), the second release occurred both earlier and preceding spring, which is generally a period of maximum foraging, as well as nesting, for tortoises. Releasing the translocatees during different seasons and following different time periods since translocation will provide an opportunity to examine repatriation success under different conditions.

The remaining aspects of the Translocation Study are ongoing.

ATTACHMENTS

1. **Initial summary of tortoise translocation from the Hyundai facility**

2. **Initial summary of 2005 tortoise translocation from the Hyundai Proving Grounds**

MEMORANDUM

To: Steve Juarez, Judy Hohman, Nicholas Browning
From: Alice Karl
Date: April 18, 2004

Re: Initial summary of tortoise translocation from the Hyundai facility

This memorandum provides a brief summary of the initial tortoise translocation from the Hyundai facility. A more detailed account, with pictures, will follow when I have access to software for downloading the films and some of the behavioral data have been analyzed.

On April 10 and 11, fifteen tortoises from the Hyundai test track facility were translocated to the one square mile translocation site (Section 12 in Township 31S and Range 39E). This removed all of the tortoises that were currently inside the site boundary (with the exception of one injured animal and one recently found clinically ill animal), plus several that were typically traveling on and off the site and had been observed pacing the fences near the site border. (Note: Because the border of the site is not yet fenced and a substantial amount of disturbance has occurred at the site, many of the currently transmittered 26 tortoises had moved off the site shortly after exiting from hibernation this spring.)

All tortoises were weighed and assessed for clinical signs at the time of translocation. None had clinical signs. Three of the translocated tortoises, captured after serology tests were run last October, have not yet been tested for *Mycoplasma agassizii* exposure. (This was foreseen and is consistent with the translocation plan and HCP.) Serology testing on all animals in the study, including control, translocated, resident, and remaining Hyundai site tortoises, will occur again in approximately one week. (It takes approximately 6-8 weeks after exposure to the pathogen for a tortoise to mount a sufficient titer level for serology tests, so any positive test for exposure to *M. agassizii* will not be the result of translocation.)

Artificial burrows were constructed for all of the tortoises prior to translocation. All tortoises were captured in the late afternoon and released at their burrows at night, when the animals were inactive and largely asleep. Eight of the tortoises were penned with temporary tortoise-proof fencing in approximately 15-foot diameter pens; the remaining seven tortoises were released without pens. Fences were removed for the penned animals at Day 3.

Tortoises were moved in relatively the same geographic configuration as they originally occurred at the Hyundai site, such that a tortoise moving east, for instance, would meet the same tortoise it would have met on the Hyundai site. Two male-female pairs of tortoises were moved together because they were either captured together in the same burrow at the time of translocation or had spent the winter in the same burrow.

Behavioral assessments will follow at a later date, but briefly, tortoises ate, copulated, and have individually either remained at their artificial burrows, occupied other tortoise's artificial burrows, or begun to construct their own burrows; they have moved various distances and directions. Tortoises, while a generalist species, are individual specialists, and their behaviors on this project are no exception to this pattern.

MEMORANDUM

To: Steve Juarez, Judy Hohman, Nicholas Browning
From: Alice Karl
Date: May 8, 2005

Re: Initial summary of 2005 tortoise translocation from the Hyundai Proving Grounds

This memorandum provides a summary of the translocation of the remaining seronegative tortoises originally found on the Hyundai facility. The new translocation site is 1.25 mi^2 and encompasses Section 17 and the southeastern quarter of Section 18 in Township 31S and Range 40E. It abuts the Department Ecological Preserve on the latter's southeastern boundary. The site has been entirely fenced with hog wire (a.k.a. "field fence") to deter intrusion by off-highway-vehicle recreationists. Attached to the lower portion of the fence is ¼ -inch mesh hardware cloth, buried and extending two feet above the ground surface, as a tortoise-proof barrier.

On April 11 and 12, following completion of the tortoise-proof fence around the new translocation site and a search of the entire site for resident tortoises, the twelve remaining seronegative tortoises from the Hyundai test track facility were translocated to the new translocation site. Tortoises were collected in the late afternoon and released at night because this coincides with the time of the day when they are inactive. All were relaxed and remained in their burrows at the time of release.

An approximately 1.5-meter long artificial burrow was constructed for each tortoise prior to translocation. No tortoises were penned at their translocation burrow, as they were in the first translocation effort in 2004. This was based on the observations in 2004 that penned, translocated tortoises spent a substantial amount of time pacing the fence and there was no evidence that penned tortoises had greater burrow fidelity than un-penned tortoises.

Tortoises were moved in relatively the same geographic configuration as they originally occurred at the Hyundai site, such that a tortoise moving east, for instance, could encounter the same tortoise it would have met on the Hyundai site.

All tortoises were watched for at least one full day immediately following release to observe behaviors and insure that no tortoise exhibited behavior that could compromise survival. In fact, the tortoises appeared "relaxed" to all observers and all tortoises spent substantial amounts of time foraging (especially on the abundant *Lotus humistratus*) as well as frequently seeking shade and/or constructing pallets for resting. Two tortoises encountering the boundary fence walked the fence prior to seeking shade. All translocated tortoises continued to be located approximately weekly during April, following this initial observation period. Subsequent locations will be consistent with the translocation plan (i.e., increased locations during high-activity periods; decreased locations during periods when tortoises could be expected to travel shorter distances).

All tortoises were weighed and assessed for clinical signs at the time of translocation. Each had been weighed previously for comparative condition indices to control (un-translocated) tortoises. Serology testing had already been completed in October 2004 on all but one of the translocated tortoises. The remaining tortoise was tested within two weeks of release, however.[5] The eight resident tortoises at the translocation site were also tested at this time. All were seronegative and none had clinical signs.

It should be noted that most tortoises had been foraging on the abundant forage this year since early March. Ample forage still remained at the translocation site at the time of translocation, although it was beginning to senesce. Ambient temperatures remained cool for most of April, so it was generally unnecessary for translocated tortoises to seek burrows for thermal relief.

In accordance with the translocation plan, vegetation data have been collected for comparison between the original capture site (Hyundai Proving Grounds), the translocation sites, and the control site. Comparisons include site characterization (density, frequency, species composition, and percent cover) as well as forage biomass. This, in combination with condition indices (i.e., mass to volume ratios), and activity levels (from data loggers) are currently being analyzed.

[5] It takes approximately 6-8 weeks after exposure to the pathogen for a tortoise to mount a sufficient titer level for serology tests, so any positive test for exposure to *M. agassizii* will not be the result of translocation.

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION FOR THE *PALEN SOLAR POWER PLANT PROJECT*

Docket No. 09-AFC-7

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(Revised 8/27/10)

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DECLARATION OF SERVICE

I, Marie Mills, declare that on October 22, 2010, I served and filed copies of the attached HYUNDAI MOTOR AMERICA MOJAVE PROVING GROUNDS DESERT TORTOISE TRANSLOCATION STUDY 2006 ANNUAL SUMMARY, dated March 2007. 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 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*)

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

OR

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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, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Marie Mills

*indicates change