Section C-5.2

MARINE CORPS BASE
TWENTY-NINE PALMS
CALIFORNIA

B. LOCATION AND SETTING

Marine Corps Base Twenty-Nine Palms is located in the southern tip of the Mojave Desert, approximately 60 miles north-northeast of Palm Springs and about 150 miles east of Los Angeles. The Colorado River and Parker Dam are about 125 miles east of the Base. Air distance from the center of Fort Irwin Reservation to the center of the Base is 70 miles. The Base covers almost 596,000 acres of desert and mountains. Elevations range from a little more than 600 feet mean sea level in the northeast portion of the Base (Dry Lake) to 4,699 feet mean sea level (Round Mountain) in the Bullion Mountains. The Base's northern boundary lies about three miles south of Highway 66 and roughly parallels this route. The easterly and westerly perimeters of the Base are bounded by desert and mountainous areas interspersed with many dry lakes (Galway Dry Lake and Emerson Dry Lake on the West, and Bristol Dry Lake on the East). The southern boundary is about six miles north of Joshua Tree National Monument.

The towns of Twenty-Nine Palms, Joshua Tree and Yucca Valley make up the local civilian community. Twenty-Nine Palms, with about 6,000 population, is the largest; Yucca Valley follows with about 5,600 and Joshua Tree is smallest with about 1,200. Total population within the sphere of influence including Marine Corps Base personnel is about 41,000.

The present mission of Marine Corps Base Twenty-Nine Palms is to provide personnel, material, and services for the maintenance, training, and support of Marine Corps forces as assigned to Force Troops, Fleet Marine Corps Air/Ground Combat Training Center to provide medical, dental and surgical facilities; to provide formal school training for personnel in the field of communications-electronics; to support operations of the Marine Corps Reserve; and to perform such additional functions as directed by the Commandant of the Marine Corps. The firing ranges on Twenty-Nine Palms can accommodate weapons from small arms, up to and including the longest range field artillery and tank cannon. Extensive tactical training areas provide maneuver room to handle brigade and larger exercises.

Both the Army and the Navy have used Twenty-Nine Palms in the past. The Army Air Corps used the base for glider training from early 1940 until March, 1943, and at that time it was called Condor Field. Although the Army abandoned the use of gliders, it remained convinced that Twenty-Nine Palms was ideal as an aircraft training center. After relinquishing control of the real estate, the Army Air Corps contracted Condor Field to the flighter pilots. This contract was in effect until 1944. The Condor Field site was in the area of

the present landing strip and the main gate. The first time the Base was used for artillery was in 1945. The Navy assumed control in August of that year. Principally, it was used as a gunnery and bombing range, with the air strip becoming an auxiliary landing field. When World War II ended, the Navy put the area on a caretaker status, and later transferred the property to the custody of San Bernardino County where it laid dormant for the next seven years.

The United States Marine Corps has used Twenty-Nine Palms since August, 1952. Following World War II, the Marine Corps searched for an area sufficiently large to accommodate a new family of weapons such as 155 mm guns, eight-inch howitzers, rockets and other missiles. On August 20, 1952, Post Order 343 from Headquarters, Marine Barracks, Camp Pendleton, activated Twenty-Nine Palms. On February 1, 1957, the Marine Corps Training Center became Marine Corps Base, Twenty-Nine Palms. Currently, some 6,458 military and 603 civilians work at Marine Corps Base Twenty-Nine Palms; 2,416 dependents and 5,907 military personnel live in military housing on the base, giving a total of 8,323 persons now housed at Twenty-Nine Palms. There are 760 military dependents living off base, mostly in the town of Twenty-Nine Palms.

National Training Center activities at the Marine Corps Base would be essentially as those described for Fort Irwin. Construction of a C-141 capable airfield would take place, but the other required facilities are now in place.

C. ENVIRONMENTAL SETTING - NATURAL CONDITIONS

(1) Climate

Marine Corps Base Twenty-Nine Palms and vicinity lies within the southwest portion of the intermountain Plateau Region of the country. Normally, precipitation occurs in the winter months, although summer thunder showers add significantly to the climatic picture of the area. Although higher values of precipitation can be anticipated in the mountainous regions, the annual valley precipitation ranges from 4.11 inches in the south to 3.67 inches in the north, and 2.28 inches in the northeast.

Temperatures range annually from 65.9 degrees inthe north, to 67.3 degrees to the south. During the month of July, temperatures are expected to range between 103.4 and 104.5 degrees F, during the day, and 69.8 to 71.9 degrees F during the night. The record July temperatures for the area are 112 degrees F (maximum) and 58 degrees F (minimum). Relative

humidity for the month of July is expected to be 31.2 percent at 0500 hours, 19.4 percent at 1200 hours, and 17.4 percent at 1700 hours.

Average windspeeds range from 3 to 10 knots, with gusts up to 45 knots. Winds are extremely variable in direction and speed. However, the predominant winds are from the west, northwest, southwest, with the northwest wind prevailing. Normally, they are calm to light in the morning, increasing to light to moderate in the afternoon and diminishing in the evening. Strong winds are common, and wind speeds accompanying the relatively frequent sandstorms may reach 55 knots. The stronger winds usually occur during the spring.

(2) Air Quality

Marine Corps Base Twenty-Nine Palms is located in the South Coast Air Quality Management District, in the Southeast Desert Air Basin. The nearest monitoring stations are at Palm Springs and Indio, California, approximately 35 miles away from Twenty-Nine Palms. Barstow is in th same air basin and has its own monitoring station. A review of the monitoring data shows that the major air quality problem in this district is from photochemical oxidants (see Appendix I, Environmental Impact Assessment, Brave Shield '77). Relevant particulate measures are not available. However, air quality at Twenty-Nine Palms is not expected to differ from Fort Irwin and the impacts would be the same.

(3) Physiography

Marine Corps Base Twenty-Nine Palms is located in the southwestern portion of the Mojave Desert Division, Basin and Range Province. This Province is characterized by small to major, often roughly parallel mountain ranges surrounding closed drainage basins. Typically, this region is cut by northwest trending faults producing grabens (basins) and horsts (mountain ranges). The mountain ranges are commonly 50 to 75 miles in length and between 6 to 15 miles in width. The low-lying lands between the various mountain ranges contain lakes in which the water has become exceedingly salty.

Topographically, the Base consists of mountains, lava flows, playas (dry lakes), alluvial deposits between the mountains, and windblown (aeolian) deposits on the western facing slopes of the mountains. The Base relies on groundwater for all of its needs, as do most of the built-up communities of the Mojave Desert.

(4) Hydrology

The main source of the water for the Base is from precipitation originating high in the San Bernardino Mountains to the west. Surface runoff from the mountains travels easterly down the Mojave River, Arrastre Creek, Antelope Creek and Pipes Wash, Little and Big Morongo Creeks, and the score of unnamed creeks to the Mojave Desert. During the course of the runoff, the Basins are recharged. Unfortunately, losses by evapotranspiration and by surface evaporation take a heavy toll from runoff which result in dry washes either before these waters reach the desert floor or shortly thereafter.

Due to the nature of the Basin and Range Province, faulting is a common phenomenon, and these faults produce groundwater barriers which either slow or stop water movement. In these areas, generally between major fault zones, groundwater basins may be identified. A groundwater basin is dependent upon many factors, but size and the thickness of the sediment above the bedrock are the most crucial. The groundwater basins that ultimately effect the water supply of Marine Corps Base Twenty-Nine Palms, are located to the West and Northwest. They are the Johnson Valley Basin, Means Valley Basin, Copper Mountain Valley Basin, Deadman Valley Basin, Warren Valley Basin, and Morongo Valley Basin. Six drilled wells are connected to the main water line and supply the water for Marine Corps Base Twenty-Nine Palms. Two potable water points exist along this pipeline, and the Surprise Spring area supplies 94% of the water used.

The United States Geological Survey has maintained an ongoing program of assessing groundwater conditions and has reported that in 1967, an estimated 97.5% of the groundwater mentioned in the 1953 report was still in storage in the Deadman Valley basic. This 2.5% decline is overshadowed by the fact that nearly 25,000 acre-feet had been pumped during that same period of time.

The present annual water consumption for the Marine permanent party and their dependents is estimated to be 2.5 million gallons per day. The drawdown on existing sources is 3 feet per year. At the present usage level, the current supply sources should be sufficient for at least twenty years. Water quality at Twenty-Nine Palms should not be affected by the proposed action.

(5) Geology

The Mojave Desert region, the most extensive of the natural provinces in California, is in large part a gigantic fault-

bounded wedge that points westward. It consists of pre-Cambrian gneisses, plutonic rocks, and severely deformed and metamorphosed sedimentary rocks. Sections of Paleozoic stratified rocks that have been metamorphosed to various degrees are present, with scattered sedimentary, metasedimentary and metavolcanic rocks of the Mesozoic age existing alongside a considerable abundance and variety of Mesozoic intrusive rocks. Middle to upper Cenozoic igneous rocks and sedimentary strata were deposited mainly in basins.

Desert lacquer (commonly patina or desert varnish) is also a characteristic feature of the region. It is described as a brownish to blackfish film of iron and manganese oxides on rock surfaces. Although the patinization is not totally understood, it is agreed that it is not a direct product of the rock. Most geologists feel that it is a coating slowly applied by the airborne minute organisms, such as pollen, lichens, algae and bacteria. Observations in Egypt of desert lacquer indicate a slow process of 2,000 to 5,000 years to apply a light brown film, and that a blackish or fully developed layer may take some 20,000 to 50,000 years to form. One can readily observe the significance of desert lacquer to archaeology and possibly to paleontology.

The information on the geology of the region and local changes to the regional trends has been documented by many authors. Although much of Marine Corps Base, Twenty-Nine Palms was visited during this assessment, much more detailed work should be planned to better interpret the geologic history.

Surficial geological units consist of recent lake deposits (playas), alluvium, alluvial fans and windblown sand, resting uncomfortably upon Pleistocene alluvium, which overlies uncomfortably on Cretaceous quartz monzonite, Jurassic hornblended diorite or gabbro, and older Mesozoic biotite quartz monzonite. Structural features in the Bravo I and X-Ray areas are gently southwest dipping Quaternary to late Tertiary nonmarine deposits formed by the movement of the Surprise Spring Fault; and in the Bravo I area, synclinal and anticlinal folding can be seen. Although paleontologic evidence was not found, many early Paleozoic, and late Cenozoic fauns have been documented just a few miles from the Base's outer boundaries. (See Figure C-1)

(6) Faulting

Marine Corps Base Twenty-Nine Palms is located within the Mojave Block, which is bounded by the San Andreas fault to the southwest and the Garlock fault to the north.

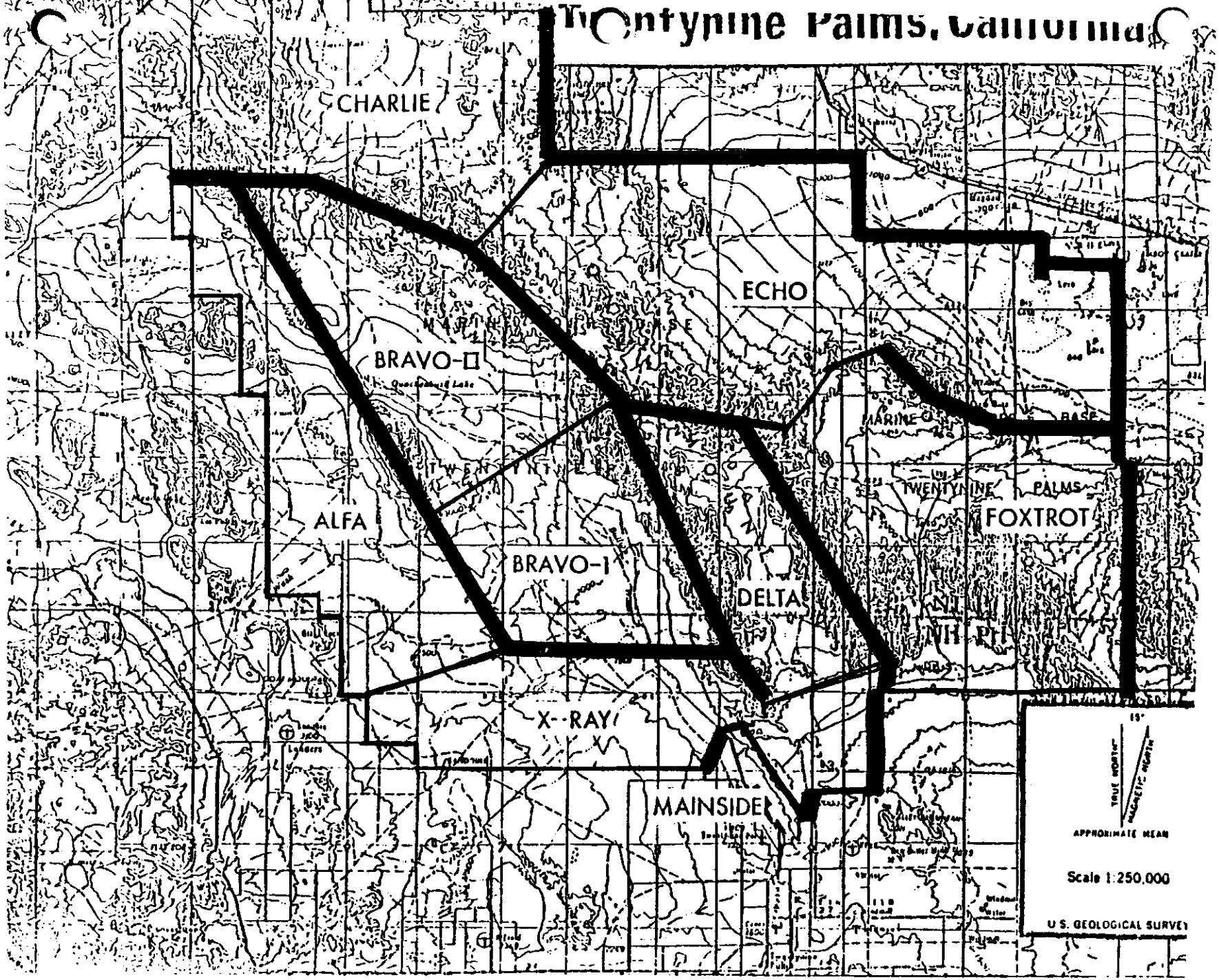
Twentynine Palms, California
CHARLIE
ECHO
BRAVO-
MARINE
BASE
TWENTYNINE
PALMS
FOXTROT
ALFA
BRAVO-1
DELTA
X-RAY
MAINSIDE
APPROXIMATE MEAN
Scale 1:250,000
U.S. GEOLOGICAL SURVEY

Figure C-1

Depresssions with closure indicate a primary fault feature. If these structures contain water, they are referred to as "Sag Ponds"; if dry, they are termed "fault sags". When faulting cuts off existing drainages or when fault sags occur in lowlands or valleys, playa (dry lake) topography results. Locally, the Base has some fifty named and unnamed faults and thirteen playas within its 932 square-mile boundary.

Recently on the evening of May 31, 1975, a quake centered near Galway Lake shook the area with a Richter magnitude of 5.2, accompanied by a surface rupture of 6.8 This new fault is now called the Galway Lake Fault and is part of the Emerson Fault Zone. Later, on the evening of November 14, 1975, a quake measuring 4.7 was felt 3 kilometers east of Goat Mountain.

(7) Seismicity

Marine Corps Base Twenty-Nine Palms, like Fort Irwin, is rated as Zone 3 in seismic risk, a zone susceptible to damage corresponding to Modified Mercalli (MM), Intensity VII or greater.

(8) Soils and Terrain

The soils contained in the proposed maneuver area are described as very complex by the United States Department of Agriculture, Soil Conservation Service, Apple Valley, California, in their study of 13,000 acres around the Headquarters Area in 1968. These soils are divided into seven main designations. The four main soil associations are found on the terraces and alluvial fans at the foot of the Rockland Mountains. Playas are the lowest portion of each of the six drainage areas on which the exercise is to be held. Duneland, in very small portions, is found in several areas.

Adelanto soils consist of moderately well to well-drained, moderately permeable (20" to 60") , moderately coarse textured soils developed on moderately sloping alluvial fans and terraces. Elevations range from 1,800 to 2,200 feet. Vegetation consists of desert shrubs, with some annual forbs and grasses. Available water holding capacity is 3.5 to 7.0 inches for the profile. Wind erosion is a problem when the native vegetation is removed or if the soil is disturbed during construction. Water erosion will be a problem any time runoff is concentrated and allowed to run in uncontrolled channels.

Cajon soil consists of somewhat excessively drained, rapidly permeable, very deep (40" to over 60"), coarse textured

soils developed in stratified coarse textured alluvium. It occupies the overflow drainage from Quackenbush Lake to Bullion Wash and Deadman Lake. The rough broken area west of Wood Canyon and north of Typsum Ridge is a series of sandy washes and clay hills. North of the rough broken area and west of Wood Canyon Trail is a rocky gravelly sandy area to Quackenbush Lake. East of Wood Canyon and north of the Op Sally area, Wood Canyon grades easterly into a course gravelly sandy loam and rocky gravelly sand.

The Delta area is a long northwest to southeast valley, bounded by the Bullion Mountains on the west, north and east sides. The soils of the Delta area are for the most part rocky gravelly sand, with gravelly, sandy loam in the valley floor areas. There is one main road running the length of the Delta area from Engineers' Pass Road in the northwest to Foxtrot pass on the northeast and then south to Missile Range 2.

The soils of the X-Ray area are mapped as highly eroded gravelly sandy loam soil. Included in this area are the Base and Surprise Spring in the western portions; missile range one, Camp Wilson and Deadman Dry Lake in the middle portion; and missile range two in the far eastern portions. Camp Wilson is the major staging area for troops and equipment.

Even though Twenty-Nine Palms consists of 596,000 acres (932 square miles) the majority of the reservation consists of rugged mountains and lava beds that are not suitable for tracked maneuver. However, there are three compartments designated as Bravo I, Bravo II and Delta that lend themselves to armored operations. None of these areas meets the optimum requirement, but by combining Bravo I and II, a fairly acceptable operation could be carried out. The terrain at Twenty-Nine Palms consists of 55% desert floor, 2% dry lake, 3% lava bed, and 40% hills and mountains, and tracked vehicle travel would be prohibited on approximately 40% of the site.

(9) Vegetation

The predominant vegetative species identified in this area are the Creosote Bush and Desert Annuals. The diversity and density of vegetative cover is highly variable, changing from a low density on the desert floor to areas of greater density on the higher elevations.

The modification of plant communities on the base has been moderate to severe in most of the maneuvering and impact areas. Examples may be seen in some of the older maneuver-

ing areas where tank tracks from the World War II era are visible. The Yucca plants in these areas appear to have suffered the heaviest impact, as witnessed by their slow recovery. The distribution and altering of plant communities is further affected by the desert weather. Vegetation which can be found in the area is listed in Table C-2.

(10) Wildlife

A desert environment is sensitive to many factors, including weather changes, which affect the wildlife population as well as plant communities; and the same factors that affect vegetation on the Base can be applied to wildlife species and population densities. The primary species found on the Base are rodents, reptiles, and resident migratory birds. A list of species which are protected or considered unique, rare, or endangered within the vicinity of Marine Corps Base Twenty-Nine Palms is given in Table C-3. The species listed by the Department of the Interior are considered to be threatened on a national scale and receive recognition as such. Lists of this type, however, are continually updated by state and federal agencies because of changes in population numbers and reevaluations of former classifications. This listing, then, may be somewhat misleading because several species, such as the banded gecko, may be more abundant in the nearby areas of Southwestern Arizona and Mexico while relatively rare in the immediate vicinity of Marine Corps Base Twenty-Nine Palms.

In 1975, Marine Corps Base Twenty-Nine Palms executed a cooperative agreement for the conservation and development of fish and wildlife resources with the Department of Interior, Fish and Wildlife Service and the State of California Fish and Game Department.

D. ARCHAEOLOGIC RESOURCES

Conventional ethnographic mapping of the Southern California desert attributes the easternmost 10% of the Marine Corps Camp to an Indian group called the Chemehuevi and all of the rest of the camp area to another Indian group called the Serrano. These peoples speak two separate and mutually unintelligible languages of a single-family called Shoshonean. Glottochronological and archaeological evidence both suggest that the Serrano are the earliest of the two populations in the area and that there is a cultural depth for this population of only 1,000 years. Abundant archaeological evidence suggests some other cultural occupation for the area extending backward for at least 10,000 years.

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MARINE CORPS BASE TWENTY NINE PALMS

Table C-2

PLANT SPECIES

(Observed)

canthaceae (Acanthus family)

Beloperone californica (chuparosa)

gavace (agave family)

Yucca baccata (Spanish bayonet)

Yucca schidigera (Spanish dagger)

poc naceae (dogbane family)

Amsonia brevifola

st aceae (Sunflower family)

Anisocoma acaulis (scalebud)

Artemisia spinescens (Bud-sage)

Baileya multiradiata (Wild marigold)

Baileya pleniradiata (Woolly marigold)

Calycoseris parryi (yellow tack-stem)

Calycoseris wrightii (White tack-stem)

Chaenactis carphoclinia (Pincushion)

Chaenactis fremontii (Chaffbush)

Coreopsis calliopsidea (Coreopsis)

Dyssodia cooperi

Encelia farinosa (Brittle-bush)

Eriophyllum wallacei (Wallace eriophyllum)

Geraea canescens (Desert sunflower)

Lasthenia glabrata

Malacothrix glabrata (Desert dandelion)

Malacothrix Sonchoides (Yellow saucers)

Monoptilon bellidiforme (Mohave desert star)

Monoptilon bellioides (Mohave Desert star)

Pectis papposa (Chinch weed)

Perityle emoryi (Rock daisy)

Psilostrophe cooperi (Paper flower)

Rafinesquia neomexicana (Desert chicory)

Senecio douglasii (Sand-wash groundsel)

PLANT SPECIES

(Observed)

Viguiera deltoidea (Parish viguiera)

Bignoniaceae (Bignonia family)

Chilopsis linearis (Desert willow)

Brassicaceae (Mustard family)

Arabis glaucovalvula (Glaucous-valved rock-cress)

Lepidium fremontii (Desert Alyssum)

Stanleya pinnata (Desert Plume)

Cactaceae (Cactus family)

Ferocatus acanthodes var. lecontei (Barrel cactus)

Mammillaria dioica

Opuntia acanthocarpa (cholla)

Opuntia bigelovii (Jumping cholla)

Opuntia chlorotica (Pancake-pear)

Opuntia echinocarpa (Silver cholla)

Opuntia ramosissima (Pencil cactus)

Chenopodiaceae (Goosefoot family)

Atriplex hymenelytra (Desert holly)

Atriplex polycanpa (Cattle spinach)

Cucurbitaceae (Groud family)

Cucurbita palmata-leaved gourd)

Euphosbiaceae (Spurge family)

Euphorbia polycarpa (Sand mat)

Fabaceae (Pea family)

Acacia greggii (catclaw)

Acacia didymocarpus

Cassia armata (Armed senna)

Cercidium microphyllum (Palo verde)

Dalea california

Dalea mollis (Hary dalea)

Dalea spinosa (Smoke tree)

PLANT SPECIES

(Observed)

Lotus rigidus (Broom lotus - Desert rock pea)

Lotus odoratus

Olneya tesota (Desert Ironwood)

Prosopis glandulosa (Mesquite)

G aniaceae (Geranium family)

Erodium texanum (Desert Heron's bill)

Erodium cicutarium (Heronbill)

Hydrophyllaceae (Waterleaf family)

Phacelia campanularia (campanulate)

Phacelia crenulate var. crenulata (Notch-leaved)

Phacelia c. var. ambigua

Krameriaceae (Krameria family)

Krameria grayi (White ratany)

Lamiaceae (Mint family)

Salazaria mexicana (Bladder-sage)

Salvia columbariae (Chia)

Salvia carduacea (Thistle sage)

Salvia mohavensis (Mohave sage)

L iaceae (Lily family)

Calochartus kennedyi (Desert mariposa)

Hesperocallis undulata (Desert lily)

Loasaceae (Stick-leaf family)

Mentzelia involucrata (Sand blazing star)

Malvaceae (Mallow family)

Sphaeralcea ambigua (Desert mallow)

Nyctaginaceae (Four O'Clock family)

Abronia micrantha (Small flowered abronia)

Abronia pogonantha (Mohave sand verbena)

Abronia villosa (Hairy sand verbena)

Allionia incarnata (Windmills)

PLANT SPECIES

(Observed)

Microbilis bigelovii var. retrorsa (Wishbone bush)

Onagraceae (Evening Primrose family)

Oenothera deltoides (Dune primrose)

Oenothera primaveris (Yellow desert primrose)

Orobanche sp. (Broom rape)

Papaveraceae (Poppy family)

Eschscholzia glyptosperma (Desert golden poppy)

Eschscholzia minutiflora (Little golden poppy)

Poaceae (Grass family)

Muhlenbergia porteri

Polemoniaceae (Phlox family)

Eriastrum densifolium

Gilia latiflora (Broad-flowered gilia)

Gilia scopulorum (Rock gilia)

Langloisia matthewsii (Desert calico)

Langloisia punctata (Spotted langloisia)

Polygonaceae (Buckwheat family)

Eriogonum fasiculatum ssp. flavoviride (California buckwheat)

Eriogonum inflatum (Desert Trumpet)

Eriogonum reniforme (Kidney-leaved buckwheat)

Ranunculaceae (Crowfoot family)

Delphinium parishii (Larkspur)

Rutaceae (Rue family)

Thamnosma montana (Turpentine-broom)

Scrophulariaceae (Figwort family)

Mimulus bigelovii (Bigelow mimulus)

Mohavea confertiflora (Ghost flower)

Penstemon clevelandii ssp. mohavensis (Mohave beard-tongue)

Penstemon eatonii (Eaton firecracker)

Penstemon thurberi (Thurber penstemon)

PLANT SPECIES

(Observed)

Simarovbaceae (Quassia family)

Castela emoryi

Solanaceae (Nightshade family)

Datura meteloides (Jimson weed)

Tamaricaceae (Tamarisk family)

Tamarix pariflora (Small flower tamarisk)

Tamarix ramosissima

Viscaceae

Phoradendron californicum (Mistletoe)

Zygophyllaceae (Caltrop family)

Kallstroemia californica (Puncture vine)

Larrea tridentata (Creosote Bush)

MARINE CORPS BASE TWENTY-NINE PALMS

Table C-3

ANALYSIS OF WILDLIFE

(Observed)

MAMMALS

Ammospermophilus leucurus - Desert Squirrel

Canis latrans - Coyote

Citellus tereticaudus - Round-tailed Ground Squirrel

Dipodomys deserti - Desert Kangaroo Rat

Lepus californicus - Black-tailed (Jack) Rabbit

Neotoma lepida - Desert Wood Rat

Perognathus formosus - Long-tailed Pocket Mouse*

Pipistrellus hesperus - Western Pipistrelle

Sylvilagus audubonii - Cottontail Rabbit

REPTILES

Callisaurus draconoides - Zebra-tailed Lizard

Cnemidophorus hyperythrus - Orange-throated Whiptail

Coleonyx variegatus - Banded Gecko* (BLM)

Crotalus cerastes - Sidewinder

Gopherus agassizi - Desert Tortoise* (CALIF. STATE REPTILE)

Phrynosoma platyrhinos - Desert Horned Lizard* (BLM)

Sauromalus obesus - Chuckwalla

Sceloporus occidentalis - Western Fence Lizard

Uma scoparia - Mohave Fringe-toed Lizard

Uta stansburiana - Side-blotched Lizard

BIRDS

Amphispiza bilineata - Desert Sparrow

Buteo jamaicensis - Red-tailed Hawk*

Calypte costae - Costa Hummingbird

Carpodacus mexicanus - House Finch

Charadrius vociferus - Killdeer

* Protected by law.

BIRDS Continued

Corvus corax - Raven*

Dendroica audubonl - Audubon Warbler

Falco mexicanus - Prairie Falcon* (USDI)

Falco sparverius - Sparrow Hawk*

Geococcyx californianus - Roadrunner*

Lanius ludovicianus - Loggerhead Shrike

Lophortyx gambelii - Gambel Quail

Mimus Polyglottos - Mockingbird

Molothrus ater - Brown-headed Cowbirds

Otus asio - Screech Owl *

Passer domesticus - House Sparrow

Phainopepla nitens - Phainopepla

Pipilo erythrophthalmus - Rufous-sided Twohee

Sturnella neglecta - Western Meadowlark

Zenaida asiatica - White-winged Dove

Zenaidura macroura - Mourning Dove

(Expected to be in the area but unobserved at the time of this stu

MAMMALS

Bassariscus Astutus - Ringtail cat (prob.)

Dipodomys agilis - Pacific Kangaroo Rat (prob.)

Dipodomys merriami - Merriam Kangaroo Rat (prob.)

Eptesicus fuscus - Big Brown Bat (poss.)

Felis concolor - Mountain Lion (poss.)*

Lynx rufus - Bobcat (poss.)

Myotis californicus - California Myotis (prob.)

Notiosorex crawfordi - Desert Shrew (prob.)

Odocoileus heminus - Mule Deer (poss.)

Ovis canadensis - Mountain Sheep (poss.)

Perognathus fallax - San Diego Pocket Mouse (prob.)

Perognathus longimembris - Little (Silky) Pocket Mouse (prob.)

* Protected by law.

REPTILES Continued

Phrynosoma coronatum - Coast Horned Lizard

Pituophis melanoleucus - Gopher Snake

Rhinochelus lecontei - Longnosed Snake

Salvadora hexalepis - Western Patch-nosed Snake

Sceloporus magister - Desert Spiny Lizard

Tantilla eiseni - Western Black-headed Snake

Trimorphodon vandenburghi - California Lyre Snake

Urosaurus graciosus - Long-tailed Brush Lizard

BIRDS

Accipiter cooperi - Cooper Hawk (prob.) *

Accipiter Striatus - Sharp-shinned Hawk (prob.)*

Aeronautes saxatalis - White-throated Swift (prob.)

Aphelocoma coerulescens - Scrub Jay (poss.)

Aquila chrysaëtos - Golden Eagle (prob.)**

Asio otus - Long-eared Owl (poss.)*

Auriparus flaviceps - Verdin (prob.)

Bubo virginianus - Great Horned Owl (prob.)*

Buteo swainsoni - Swainson Hawk (prob.)*

Calypte anna - Anna Hummingbird (prob.)

Campylorhincus brunneicapillus - Cactus Wren (prob.)

Catherpes mexicanus - Canyon Wren (prob.)

Chrodeiles acutipennis - Lesser Nighthawk (prob.)

Circus cyaneus - Marsh Hawk (poss.)*

Colaptes cafer - Red-shafted Flicker (poss.)

Dendrocopos scalaris - Ladder-backed Woodpecker (prob.)

Eremophila alpestris - Traill Flycatcher (poss.)

Gymnorpinus cyanocephalus - Pinon Jay (poss.)

Icterus bullockii - Bullock Oriole

Icterus cucullatus - Hooded Oriole

*Protected by State of California law
** Protected by Federal law

BIRDS Continued

Icterus parisorium - Scott Oriole (poss.)

Junco oreganus - Oregon Junco (prob.)

Melospixa melodia - Song Sparrow (poss.)

Myiarchus cinerascens - Ash-throated Flycatcher (prob.)

Oreortyx pictus - Mountain Quail (poss.)

Passerina amoena - Lazuli Bunting (poss.)

Petrochelidon pyrrhonota - Cliff Swallow (prob.)

Phalaenoptilus nutallii - Poor-will (prob.)

Pheucticus melanocephalus - Black-headed Grosbeak (prob.)

Piranga ludoviciana - Western Tanager (prob.)

Polioptila caerulea - Blue-gray Gnatcatcher

Polioptila melanura - Black-tailed Gnatchatcher (prob.)

Salpinctes obsoletus - Rock Wren (prob.)

Sayornis nigricans - Black Phoebe (poss.)

Sayornis saya - Say Phoebe (prob.)

Selasphorus rufus - Rufous Hummingbird (poss.)

Speotyto cunicularia - Burrowing Owl (prob.)*

Spinus psaltria - Lesser Goldfinch (prob.)

Spinus lawrencei - Lawrence Goldfinch (prob.)

Spizella atrogularis - Black-chinned Sparrow

Spizella breweri - Brewer Sparrow (prob.)

Spizella passerino - Chipping Sparrow (prob.)

Thryomanes bewickii - Bewick Wren (prob.)

Toxostoma lacontei - Le Conte Thrasher (prob.)

Tyrannus verticalis - Western Kingbird (prob.)

Tyrannus vociferans - Cassin Kingbird (poss.)

Tyto alba - Barn Owl (poss.)

Vireo solitarius - Solitary Vireo (prob.)

Vireo vicinior - Gray Vireo (poss.)

Zonotrichia leucophrys - White-crowned Sparrow (prob.)

* Protected by law

MAMMALS Continued

Perognathus pencillatus - Desert Pocket Mouse (prob.)

Perognathus spinatus - Spiny Pocket Mouse (prob.)

Peromyscus crinitus - Canyon Mouse (prob.)

Peromyscus eremicus - Cactus Mouse (prob.)

Peromyscus maniculatus - Deer Mouse (poss.)

Procyon lotor - Raccoon (poss.)

Reithrodontomys megalotis - Western Harvest Mouse (prob.)

Taxidea taxus - Badger (poss.)

Urocyon cinereoargenteus - Gray Fox (prob.)

Vulpes macrotis - Kit Fox (prob.)

REPTILES

Arizona elegans - Glossy Snake

Chionactis occipitalis - Western Shovel-nosed Snake

Cnemidophorus tigris - Western Whiptail

Crotalus atrox - Western Diamondback Rattlesnake

Crotalus mitchelli - Speckled Rattlesnake

Crotalus scutulatus - Mohave Rattlesnake

Crotalus viridis - Western Rattlesnake

Crotaphytus collaris - Collard Lizard*

Crotaphytus wislizenii - Leopard Lizard*

Dipsosaurus dorsalis - Desert Iguana*

Eumeces gilberti - Gilbert slink

Hypsiglena torquata - Night Snake

Lampropeltis getulus - Common Kingsnake

Leptotyphlops humilis - Western Blind Snake

Lichanura trivirgata - Rosy Boa

Masticophis flagellum - Red Racer

Masticophis lateralis - Striped Racer

* Protected by law.

In the latter half of the 19th century and the first years of the 20th century, only one spot in the entire region was identified as the site of a permanent Indian village. This was the oasis of Mara at Twenty-Nine Palms, about 7 kilometers south of the Marine Corps camp headquarters. From 1855 to 1913 Mara was occupied alternately and sometimes simultaneously by both the Serrano and Chemehuevi. However, in spite of the silence of the historic sources, the archaeological remains at Surprise Springs suggest that this site had a more intensive Indian occupation in the 19th century than did Mara.

Both the Serrano and the Chemehuevi, and presumably their predecessors spent only the short winter season at their permanent villages. During the long summers, they travelled about to harvest the products of their environment. Most of the archaeological sites in the Marine Base represent camping spots used by these special collection parties during their yearly rounds.

A reconnaissance archaeological investigation has been conducted on the Marine Corps Base, and many areas containing rock art in the form of petroglyphs and pictographs have been identified. Site cards have been completed and are recorded at the San Bernardino County Museum and the State Historical Preservation Office in Sacramento, California. The prehistoric cultural features found in the maneuver areas include rock shelters, open sites with habitation scatters, fire hearths and other occupation evidence, and a chipping material work site. Evidence of prehistoric occupation in the Alpha area is abundant and suggests the ancient occupation of the entire shoreline of Emerson Lake over an area extending back from the lake. This site has been twice defined by previous investigators and assigned site numbers (SBr 397 and SBr 426). A cluster of special use, temporary camp sites is situated in sand dune blowouts in the arc south of Emerson Lake. Nine previously unknown archaeological sites have also been located in the sand dune area adjacent to Deadman Lake. All of these are small sites reflecting short-term use, probably during mesquite bean harvests. There is also an enormous and extremely important archaeological site at Surprise Springs. The horizontal area of the site slightly exceeds one square kilometer and it consists of a midden, the detritus of human occupation, about 1.5 meters deep. The site was first reported in 1940 (recorded as SBr-424), and test excavations have been conducted.

In addition, several other sites have been identified and are considered worthy for nomination to the National Register of Historic Places. Two of the significant sites are located

in the general vicinity of Mesquite Lake and two others are in the vicinity of Lavic Lake. Neither are in areas used for military maneuvers. Two sides in the Foxtrot area have been nominated to the National Register of Historic Places but have not yet been approved.

E. AIRSPACE

Twenty-Nine Palms is within the R2501 Restricted Area airspace. Interoperability problems would exist but could be resolved with some difficulty. The capability of the expeditionary runway would need expansion.

San Bernardino County has adopted noise quality standards which are designated for four basic land use activity categories. Marine Corps Base Twenty-Nine Palms and the lands around the base fall into the category of insensitive lands. Fort Irwin, with the exception of the cantonment area, is also in this category. The areas involved are sufficiently remote to allow full power operation of jamming equipment. However, since Air Force Davis and Marine Corps aircraft are portions of the reservation, coordination is required. Noise level standards are the same as at Fort Irwin, and the same impact would be expected from National Training Center use.

F. SOCIOECONOMIC

(1) General

The Morongo Valley is the geographic setting for a series of small towns strung along the major east-west highway (State Highway 62). These towns, from west to east, are Morongo Valley, Yucca Valley, Joshua Tree, and Twenty-Nine Palms. The population within this sphere of influence is about 41,000, including personnel from the Marine Corps Base Twenty-Nine Palms. In addition, the Joshua Tree National Monument hosted over 731,822 visitors in 1976. California State Highway 62 is one of the main routes to the Colorado River and its recreational resorts. The populations of the towns are: Morongo Valley, 1,800; Yucca Valley, 6,800; Joshua Tree, 1,200; and Twenty-Nine Palms, 6,000.

Business in the greater Morongo Valley is oriented toward the recreationist, including those who pass through on their way to the Colorado River recreational areas and those who stay within the area. The Marine Corps Base is the largest employer in the Valley. Military personnel and their dependents live in the valley and spend most of their income with the local merchants. Civilian workers generally have also established residency in the area and their income provides a stable economic environment for the community.

The area in which Twenty-Nine Palms lies is limited in extent, as it is only about 50 miles from east to west and three miles to ten miles wide. However, within this reach are found many interesting differences, from the uninhabited desert to the conveniences of most modern cities. In the immediate vicinity, many thousands of acres were homesteaded, and from this beginning the present town developed. Many of the original homesteaders and their families still live in the area. Due to the attractive, healthful climate, and the expansion of the "jackrabbit" Homestead Program, a population spurt occurred in the late 1950s and 1960s. Many retired senior citizens have moved into the area and have established their homes within the valley. The limited incomes of these senior citizens enhance the economics of the valley and impart a sense of economic stability, the result of the frugality generally associated with people on a limited fixed income.

(2) Education

All Marine dependents attend school in Twenty-Nine Palms and are bussed to and from the base housing areas. There are three elementary schools, one intermediate (junior high), and one high school. Adult high school programs and advance degree programs associated with college or junior college are also available.

(3) Community Services

Twenty-Nine Palms offers motel-hotel accommodations, restaurants, clubs, a public golf course, swimming pools and two large parks. In addition, the city has a community hospital, library, an airport, and the Art Guild Galley which is located at the Utah Trails Oasis. Active senior citizens enjoy their own clubhouse.

G. MARINE CORPS BASE FACILITIES

Marine Corps Base, Twenty-Nine Palms is a self-contained community in a compact hillside setting on the south central edge of the reservation. It is commonly referred to as Mainside. It has all the facilities normal to a military post except for a hospital and schools.

(1) Housing and Services

On the base, there are 4,478 adequate spaces of bachelor enlisted quarters and 100 adequate spaces of bachelor officers quarters. In October, 1978, 834 new spaces of bachelor enlisted quarters will be added. Married personnel are housed in 1,029 units varying from five bedrooms to two

bedrooms. All housing is modern and well-maintained. Twenty-Nine Palms has more than sufficient housing on base to accommodate National Training Center needs. The proposed action would cause a decrease in the use of both on-base and off-base housing.

Base services include chapels, a nursery, a child care center, commissary and exchange, post office, library, a bank and a credit union. There is a dental clinic and a dispensary which is a branch of the Naval Regional Medical Center at Camp Pendleton, California. The 40-bed facility was remodeled in 1965 and has two operating rooms, two delivery rooms, a recovery room, dependent and military wards, a family clinic, and laboratory and X-ray facilities. The use of community medical facilities by military personnel is virtually non-existent.

Clubs are available for all Marine personnel and dependents. There is a modern gymnasium with a fitness center. Three pools fill aquatic needs, and one is Olympic size. Bowling lanes, a moto cross, several hobby shops, a theater, riding stable, miniature golf, a Par 72 golf course, and several softball diamonds and tennis courts complete the sports-recreational complex.

(2) Utilities

The capacities of base utilities plants are adequate for expansion of systems to accommodate a National Training Center ("National Training Center - Alternative Site Analysis"). Electricity is supplied by Southern California Edison. The base has its own telephone system, and Pacific Telephone serves the surrounding area. Southern California Gas Company provides gas for the Twenty-Nine Palms area.

(3) Sewage Treatment and Disposal

The sewage treatment facility is capable of handling 2.5 million gallons per day, and current use is 1.2 million gallons per day. Locating the National Training Center at Twenty-Nine Palms would not increase current usage.

(4) Solid Waste Disposal

Solid waste disposal capacity is more than adequate for current or National Training Center needs.

H. RELATIONSHIP OF PROPOSED ACTION TO LAND USE PLANS, POLICIES AND CONTROLS

The land surrounding Marine Corps Base Twenty-Nine Palms is zoned Desert Living which permits the broadest use of residential zoned land. Use of the Marine Corps Base for the National Training Center would not have an effect on the surrounding land, since the increased numbers of people would be transient and activities would be confined to the reservation. The proposed activities are in consonance with the Land Use Plans, Policies and Controls of the Base, as the current mission of the Base is to provide personnel and material for training and support of Marine Corps forces, and it is also asked to conduct and evaluate field training exercises and field firing exercises involving organizations and units of all of the Armed Forces. Therefore, the National Training Center represents no real change in mission, affecting only intensity of use and type of maneuvers.

Marine Corps Base Twenty-Nine Palms, in accordance with the authority contained in Public Laws 85337, 86787 and 93452, executed a cooperative agreement for the conservation and development of Fish and Wildlife Resources with the Department of Interior, Fish and Wildlife Service and the State of California Fish and Game Department in 1975. This agreement could be reexecuted by the Army, when required.

I. THE PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT

Insofar as is practicable, operational planning and execution would be conducted so as to avoid potential problems and to minimize those which are unavoidable. However, certain impacts would occur and are discussed below.

(1) Air Quality (See Table C-4)

Emissions at Marine Corps Base Twenty-Nine Palms would predominantly occur during recurrent 15-18-day periods, which includes the task force exercise and required deployment/redeployment activities. Pollution would be widespread, in both time and location, and should dissipate with normal air currents. Oxides of sulfur and nitrogen are added to the atmosphere by weapons firing, in amounts which cannot be quantified due to the dispersion of the troops throughout the area. Considering the nature of the area where the firing occurs, the air volume and movement, and the intermittent nature of the firing, it is unlikely that these contaminants will have a measurable effect on ambient air quality. Nor is the assimulative quality of the biosphere within the area expected to suffer a significant adverse

effect. Despite continuing emissions from gasoline and diesel-powered tracked and wheeled vehicles, the use of Twenty-Nine Palms for military exercises is also not expected to cause serious effects on ambient levels of oxidants, carbon monoxide, oxides of sulfur or oxides of nitrogen.

The direct shear action of vehicles on the desert surface contributes to loss of soil material and the pollution of the air, as is well known by those taking part in maneuvers. Destabilization of the soil by vehicle use of maneuver areas causes large, direct yields of airborne particles, and promotes later loss of soil to deflation (wind erosion) under high winds. The overall impact on air quality at Twenty-Nine Palms is expected to be the same as predicted for the Fort Irwin site.

(2) Hydrology

In the desert, water is always of concern and requires close management and conservation measures. The water resources of the Twenty-Nine Palms area appear adequate and are based on replenishable aquifers. Establishment of the National Training Center at the Marine Corps Base would require 250 million gallons of water per year. Present annual consumption level for the Marine permanent party and their dependents is estimated to be 912.5 gallons per year, and transient troop units add to this level. Thus, the use of water resources would be decreased if the National Training Center were established at Marine Corps Base Twenty-Nine Palms.

(3) Sewage Treatment and Disposal

The capacity of the current system is approximately two times the current volume. The National Training Center would not increase that usage, and the impact would not be significant.

(4) Geology

National Training Center operations would have no effect on the geologic setting of Marine Corps Base Twenty-Nine Palms.

(5) Soils

The operation of wheeled and tracked vehicles over the area may have a long-term effect on the soils. At present, there is a multiplicity of wheeled and tracked vehicle tracks visible on the ground surface, the results of many years of use. Specific tests in BOLD EAGLE '76 showed a measurable density increase in multiple tracks of 21 to 44 percent, with a hard-packed layer an average of 3-1/2 inches below the surface. This "pack" layer has been found throughout the proposed National Training Center maneuver areas.

There would be some increased rates of erosion where the surface "crust" or desert "pavement" is broken. Water transport in, down, and across slope tracks, and wind erosion in broken "pavement" areas can be expected. Inspection of older tracks shows that once the fine sands are eroded, the "pavement" merely heals with a track imprint in it.

Seasonal dryness during some of the exercises may be expected to generate large amounts of dust. Silt grains may be expected to be carried a great distance before being redeposited. Areas of planned concentration of troops and equipment require special attention for control of desert dust. Addiionally, "cyclonic" wind stream blast from helicopters may be expected to create large dust storms in the refueling and staging areas. While the larger grains of sand may be expected to resettle immediately, the silt particles and fine clays would have to be controlled by soil management operations.

(6) Vegetation

The estimation of the potential impact of the National Training Center on native desert vegetation is based on: (1) field observation of damage accrued in the training areas during normal training; and (2) studies conducted at Fort Irwin for BOLD EAGLE '76 and BRAVE SHIELD '77.

In areas where vehicles tend to follow in the same trail, the area becomes denuded of all vegetation and major roads are established. In areas where only several vehicles have traveled, damage to the vegetation appears to be minimal with annuals appearing in the older tracks. When large-wheeled and tracked, vehicles make sharp turns, they displace large amounts of soil and vegetation, and this action may inhibit recovery of scrub-type vegetation. Also, if scrub-type vegetation is cut or used for camouflage, this can have an adverse impact on the sparse species.

(7) Wildlife

The destruction of vegetation around springs, watering holes and/or where it is used as nesting, roosting sites, and protection would have an impact on wildlife, especially Raptors (birds of prey). However, the destruction of vegetation in the areas where much of the movement would be conducted would affect only rodents and reptiles. Many of the species live in burrows under the mantle of the desert floor and may be crushed by vehicle traffic, thus having an impact not only on the species, but possibly on the predators which prey upon them. The disturbance of rocky formations, caves or deep crevices can have an additional impact on the

wildlife, particularly on reptiles which are ectothermic and may not be able to find new cover in time for survival. Due to the scarcity of water, the California Mule Deer does not appear to inhabit the area. The only impact that might occur on the coyote would be the reduction of food, or billeting near watering areas. Any collecting, killing or undue harassment of any species of wildlife will, of course, have an impact not only on that species but others in the ecosystem.

(8) Archaeologic Resources

The impact of National Training Center operations on the archaeological resources in the maneuver area may be significant. During a reconnaissance investigation of the 232 square mile study area, 55 locations of archaeological value were identified. Areas of Marine Corps Base Twenty-Nine Palms outside the regularly used operational training areas offer a potentially fruitful field for the chronological reconstruction of the aboriginal cultures of the Mojave Desert; and for a detailed reconstruction of the adaptation of prehistoric man to a changing environment, and explanation of the nature of those changes. Although damage to sites by vehicle travel is likely to be inadvertent, some risk of disturbing or destroying archaeological material is present in National Training Center maneuvers. A much greater risk is the deliberate disturbance of sites and archaeological material by persons hunting for artifacts for personal possession.

The Lavic Lake area, with its prehistoric habitation site is not subject to ordnance impact, and National Training Center operations would have little or no impact upon it. Heavy use of the Surprise Spring area may, however, result in a significant impact. This area has been nominated for the National Register of Historical Sites because of its deep midden which represents an intensity of occupation unequalled in the California desert.

J. SOCIOECONOMIC IMPACT - TWENTY-NINE PALMS

Units participating in National Training Center activities would be fewer than the present population. Most of the personnel engaged in operations would be deployed directly to bivouac areas and remain on base until the training is over. There is enough housing on base to provide for permanent personnel, and complete facilities are available.

Nevertheless, strongly adverse economic impact to the City of Twenty-Nine Palms would result from the decrease in military and dependent population and the loss of 285 civilian

jobs. This would cause housing vacancies and a decrease in demand for goods and services in the area, which would definitely be felt as an economic loss to the community. The Marine Corps Base is the largest employer in the Morongo Valley, and the local merchants depend heavily on trading with Base employees and their families. The stable economic environment of the Twenty-Nine Palms area would be severely disrupted if the current military activities were discontinued.

K. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH COULD NOT BE AVOIDED

(1) Air Quality

Small amounts of oxides of sulfur and nitrogen will be added to the air as a result of weapon firing and bombing. Vehicular and aircraft exhaust emissions and dust raised by ground traffic will be widespread.

(2) Soils

Compaction of surface area in the tracks of vehicles, accelerated erosion from the "channelization" effect of runoff waters in vehicle tracks, and the aeolian removal of disturbed topsoils will all have a localized long-term effect on soil stability.

(3) Vegetation

Due to vegetation destruction and root damage, a significant loss in productivity may be expected. Also a decrease in productivity will result from the construction of new roads and bivouac areas. Further, soil compaction and roadside water runoff will have a deleterious effect on plant productivity. In heavy maneuver areas, significant uprooting and destruction of ground cover, shrubs, and small trees will occur. The reduction and/or loss of local communities of endemic vegetation also will occur at campsites and in mountain passes. All this, together with the loss of mature tree stands by crushing with mechanized equipment, and camouflaging requirements, will have an impact on the vegetation.

(4) Wildlife

Both the disturbance of wildlife, including some threatened or protected species, and the destruction of subsurface borrows of rodents and reptiles are expected to have a short-term effect. In addition, this short-term impact will effect the birds of the area. The increase in noise levels and activity during the exercises may frighten and/or shock

wildlife, making them easy prey for predators. The cumulative effect of loss of prey in the food chain may result in a long-term reduction of wildlife numbers.

(5) Archaeology

The removal of souvenir artifacts and the possible inadvertent destruction of sites not recognizable to anyone but trained specialists may destroy sequential evidence. The destruction of open sites may occur from the breaking open of new roads and trails in previously undisturbed areas.

(6) Mitigation Measures

The major problems of dust pollution could be reduced considerably by the application of a soil stabilizer in the Camp Wilson area, equpment staging areas, all main access roadsides, and exits to field roads and the airfield. The soil stabilizer would be applied as needed to achieve desired dust control on all main dirt roads to and in the Camp Wilson complex. Ripping, discing or harrowing of all identifiable campsites or bivouac areas, except Camp Wilson proper, would also be accomplished as required.

The current predictions of long and short term recovery for the vegetation disturbed by vehicular traffic are strictly theoretical. Such predictions could be confirmed by follow-up analysis. Follow-up studies in selected sites within the area would also be valuable in the planning and execution of future large-scale exercises in a desert environment.

L. EXTENT TO WHICH THE PROPOSED ACTION FORECLOSES FUTURE OPTIONS

No permanent restrictions to later changes in land use are foreseen due to Army operations of the National Training Center at Marine Corps Base Twenty-Nine Palms.

M. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Labor resources will be expended in the construction of maintenance facilities, rehabilitation of other facilities and range targetry installation. Material resources will also be expended in construction and rehabilitation projects. The replacement of targets should be a major expenditure. Fuels expended would be within the range of expenditure for normal unit training if the National Training Center were not established. The removal of vegetation by establishing new roads or tracks will affect the quality of the environment by removing ground cover, with a subsequent affect upon wildlife habitat. In addition, soil compaction resulting

from new roads or trails can permanently alter local drainage patterns. The possible destruction or degradation of potentially significant archaeological sites and disturbance of surface material would result in an irreversible and irretrievable loss of cultural resources.

N. NATIONAL DEFENSE CONSIDERATIONS

It is the position of the Secretary of the Army and the Chief of Staff that a large National Training Center should be developed which would be capable of physically supporting the Army's combined arms tactical unit training while simultaneously integrating similar exercises with the Air Force, Navy and Marine Corps. Marine Corps Base Twenty-Nine Palms environment is envisioned as such a center.

The benefits accruing to National Defense through the use of Marine Corps Base Twenty-Nine Palms would be offset to a degree by the loss of the training area to the United States Marine Corps Base. Some Marine unit training could be accommodated, but not the current frequency of field exercises.

O. BENEFITS OF ALTERNATIVES THAT USE FORT IRWIN

Since it is not feasible for both the Army and the United States Marine Corps to use Marine Corps Base Twenty-Nine Palms concurrently, the use of Fort Irwin in place of Marine Corps Base Twenty-Nine Palms would create an adverse socio-economic impact in the towns surrounding the base. Moreover, Fort Irwin is currently used by both the active Army and the California National Guard for tracked vehicle maneuvering, while Marine Corps Base Twenty-Nine Palms is used primarily for foot infantry maneuvering. Establishing the National Training Center at Fort Irwin thus changes only the intensity of use of the terrain, but changes both the intensity and type of use of the terrain at Marine Corps Base Twenty-Nine Palms.

There is no requirement to transfer ongoing operations at Fort Irwin to another site, with an incumbent environmental effect at the new site. Both active Army and Guard operations can be accommodated concurrently at Fort Irwin, whereas Army and Marine activities cannot proceed side-by-side at Marine Corps Base Twenty-Nine Palms. Transference of the Marine mission would further impact whatever site were selected for it.