3.0 ENVIRONMENTAL IMPACTS

3.1 INTRODUCTION

The development of a National Training Center would have different levels and types of impacts on different aras of the natural and socioeconomic environment. Proposed maneuvers associated with force-on-force warfare simulation would affect the reservation as a whole, with impacts primarily on the natural environment. The influx of large numbers of personnel to the base would have a dramatic impact on the cantonment area, where thousands would be housed. Impacts would include increased demand for water for domestic use, and for sewage treatment. In addition, the on-post population would be subject to high noise levels from Army maneuvers. The National Training Center would also create a demand for off-post labor and resouces for construction and rehabilitation of Fort facilities, as well as for ongoing civilian support operations. This increased direct and indirect employment force would generate population increases in the employment force which would generate population increases in the Barstow area, with significant impacts on the economic and social environments of the Barstow area.

Because of the differing types and levels of impacts on the environments of the reservation as a whole, the cantonment area and on the Barstow area, impacts on environmental factors are considered separate for each of the three areas in this report. Environmental and socioeconomic factors considered for each area are as follows:

The Reservation

- Use of Fire and Maneuver Areas
- Natural Conditions
  - Soils
  - Air Quality
  - Vegetation
  - Wildlife
- Archaeologic and Historic Resources
- Aesthetic Quality
- Radio Interference
- Energy

The Cantonment Area

- Water Supply and Quality
- Sewage Treatment and Waste Disposal
- Noise
- Energy

The Barstow Area

- Economic Conditions
  - Population
  - Employment
  - Income
  - Retail Sales
- Housing
- Community Services
  - County and Special Districts
  - Health Services
  - Education
  - Parks and Recreation
  - Public Safety
  - Transportation
- Energy

The probable impacts of the proposed National Training Center on each of the above environmental and socioeconomic factors is described, by area, in the following sections. The use of the future tense is for convenience, as the Center is still a proposal and all impacts discussed are conditional on the proposal being implemented.

The Reservation

Chapter 2
Environmental Setting

3.2 USE OF FIRE AND MANEUVER AREAS

Assuming implementation of the proposed action is completed, the use of the Fort Irwin Reservation for field training exercises will increase by roughly 75% over fiscal year 1978 use levels. This includes use by Army Reserve and National Guard troops, as well as Forces Command, Readiness Command, and Reforger, as outlined in Appendix B.

3.3 NATURAL CONDITIONS

The natural elements which form the desert landscape of Fort Irwin have been altered to some extent every time man has been present there in any quantity of numbers. The desert environment, with its arid climate, preserves such evidence of use. Because of considerable human use, the desert of Fort Irwin is altered from its original natural state.

Expanded military use of the Fort Irwin Reservation by 75% will increase the intensity of activities causing physical change and most likely will speed up the rate of such change.

The use of wheeled and tracked vehicles on the desert damages the soil, destroys plants, animal habitat, and animals, and at times generates vast quantities of dust. While some of these effects will be experienced only on the site and its immediate surroundings, the creation of dust, for instance, has far-reaching significance, as suspended particulate matter generated in the Mojave Desert is carried nationwide by the earth's wind circulation system.

The ongoing and increased use of Fort Irwin for wheeled and tracked vehicle training and maneuvers will continue to cause the most damage to the desert surface. Figure 11 shows the South Tiefort Range, an area with moderate use, and Figure 12 shows the main tank trail. These two photographs illustrate the increasing disturbance of the desert surface which occurs with increse in intensity and duration of use. As in the past, the disturbance of the desert will occur principally in the alluvial fill valleys and not on the steeper hillslopes and mountains.

The effect of concentrating use by tank battalion rotations in the two maneuver areas is expected to be an increase in soil disturbance and erosion rate.

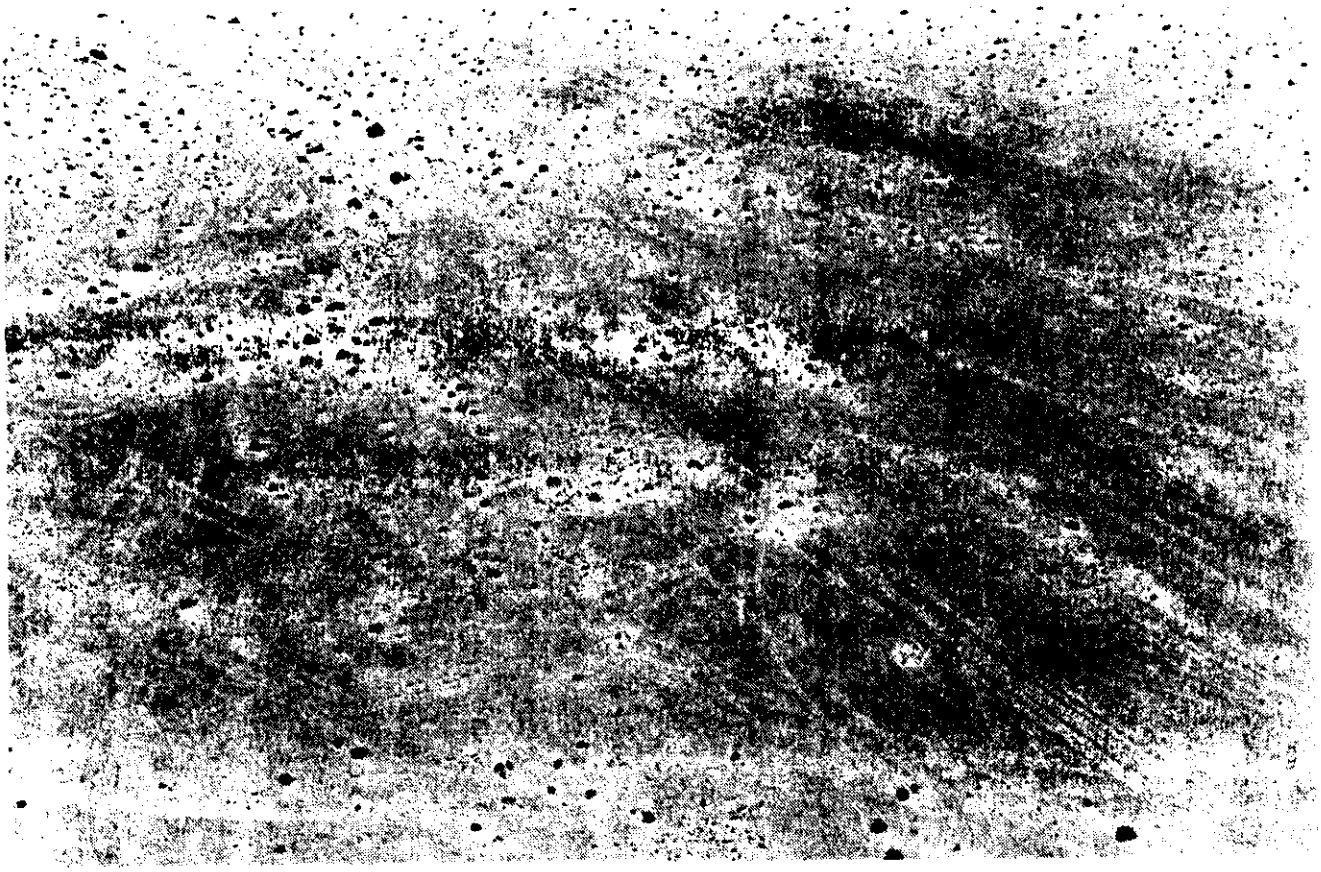


Figure 11. Moderate Use Area in South Tiefort Range

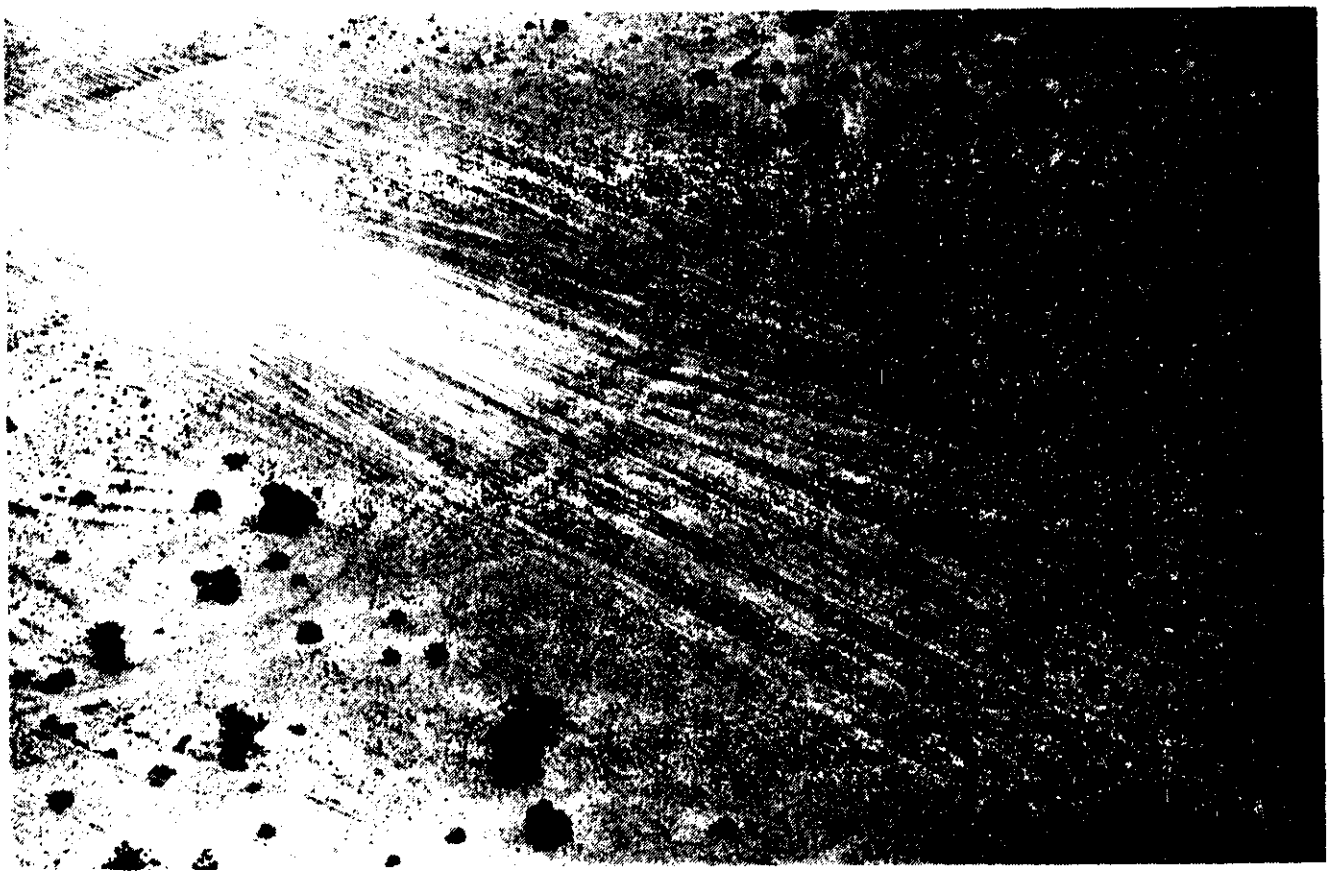


Figure 12. Main Tank Trail Southeast of Cantonment

3.3.1 Soils

Desert training activities that result in direct effect on the soil include the use of wheeled and tracked vehicles on the desert surface, the establishment of bivouac sites and the impact of live fire ordnance from both aircraft and ground sources. Of these, the most apparent and widespread on Fort Irwin is the use of vehicles on the desert.

The use of wheeled and tracked vehicles on the Fort Irwin desert has several direct effects on the soil:

- Direct mechanical action exerts compaction and shear forces on the soil surface. In general, the degree of soil damage is proportional to the energy applied to the soil. Therefore, the greater the number of passes of vehicles over a given area, the greater the damage to the soil. Both compaction and shear stresses disturb the soil structure and result in physical changes, which can alter the water-holding capacity of the soil, the ability of water to move through the soil, and the variability of soil temperature. Figures 13 and 14 illustrate the impacts of increased compaction and shear forces on the soil surface.

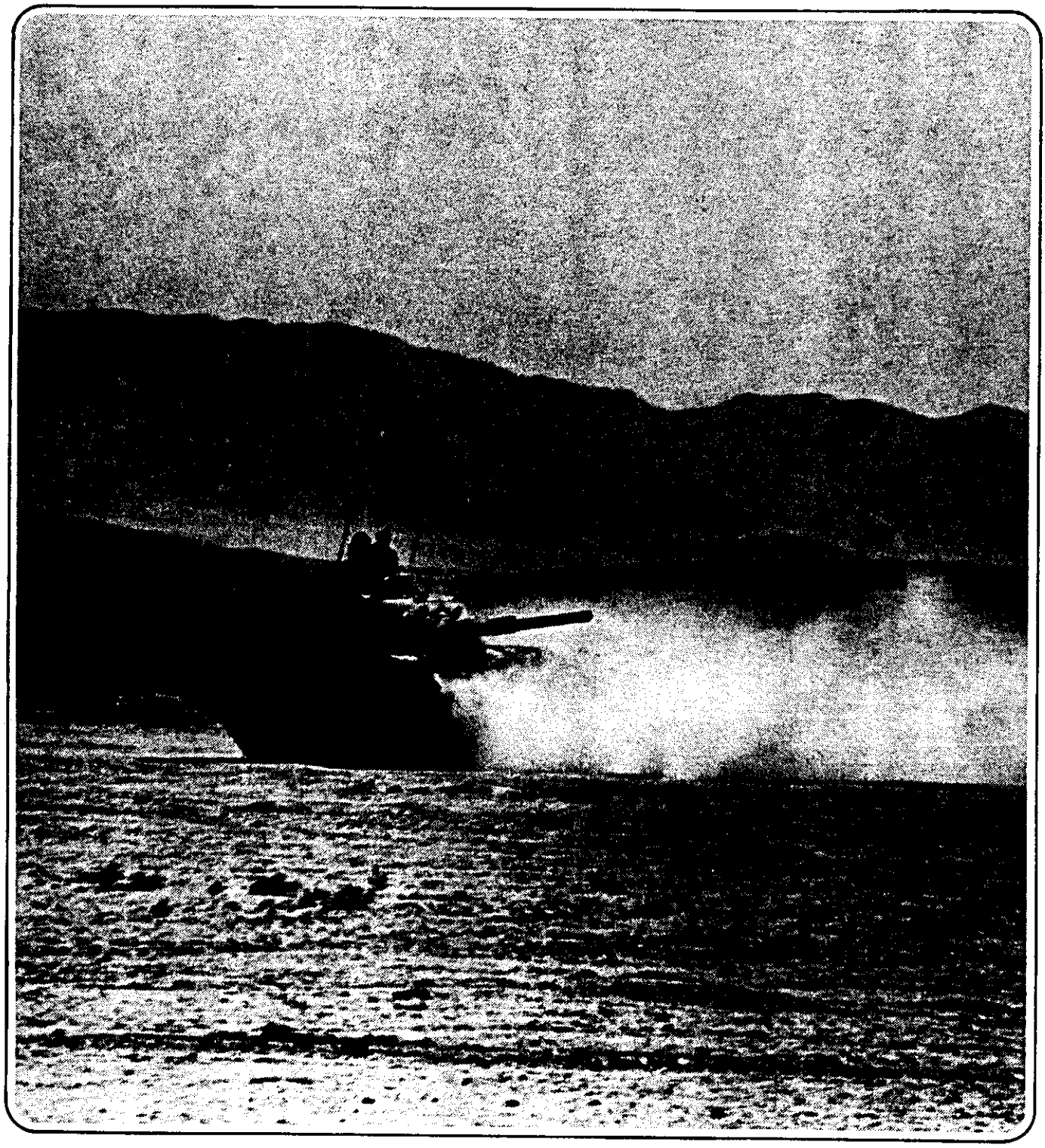
- Lag gravels that make up desert pavement are disturbed. Disturbance of the desert pavement and algal or chemical crusts exposes a soil mix of cobbles, pebbles, sands and finer-grained materials, and promotes accelerated erosion.

- Disturbed soil becomes more susceptible to erosion by water and wind. Water will carry the fines downslope to be redeposited in washes and flats. In the broad washes, the fines are easily blown away by strong winds.

- Fine particles are propelled into suspension. The mechanical action and air currents caused by wheeled and tracked vehicles on the desert floor result in the mechanical lifting of fine soil particles off the soil surface and into the air above the sheltered boundary layer, where they become suspended particulate matter or dust.

3.3.2 Air Quality

Conversion of Fort Irwin to a National Training Center will result in new stationary and mobile sources of air pollution. New stationary sources will include two equipment maintenance shops, fuel storage facilities, pumping sites, and new



Chapter 3

Environmental Impact of the Proposed Action

Figure 13. Mechanical Action of Tracked Vehicles on Soil

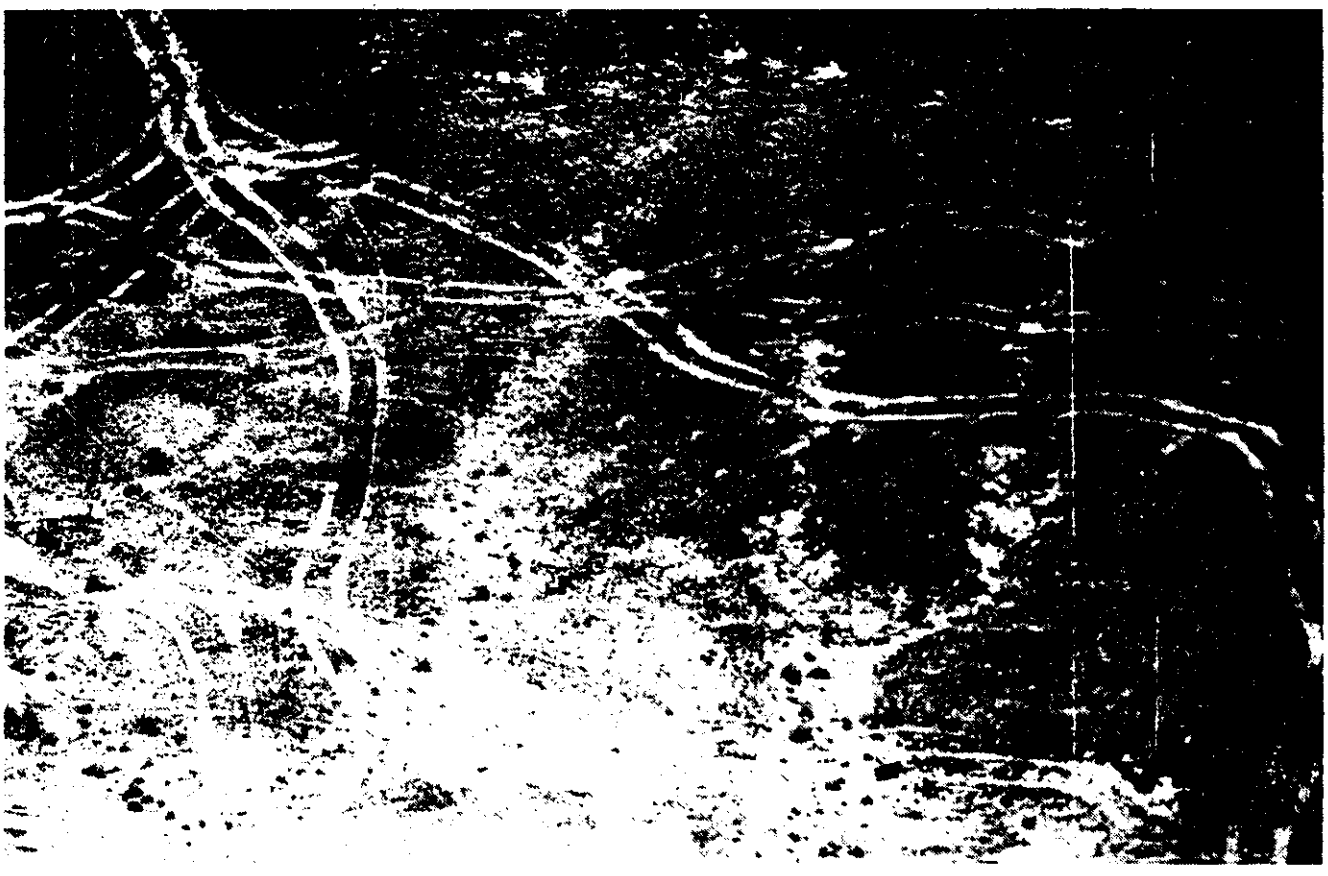


Figure 14. Results of Increased Lateral Shear Stress

boilers and incinerators. New mobile sources will include jet aircraft, diesel- and gasoline-fueled military vehicles, and personal vehicles owned by Fort Irwin personnel. Approximately 1,000 off-post employees will travel over the Barstow-Fort Irwin access road to the Fort each day.

The proposed project will lead to a negligible increase in emission levels of carbon-monoxide, nitric oxides, sulfor oxides, reactive hydrocarbons and significant increases in primary particulates.

No significant threat to public health by fugitive dust is expected though it may be a nuisance and may reduce visibility in some areas.

See Section B.3.3.2 of the Appendices for a full discussion of air quality impacts.

3.3.3 Vegetation

A. General

Continued use of range and maneuver areas on Fort Irwin will cause damage to vegetation. The principal sources of damaging effects are the use of tracked and wheeled vehicles on the desert, the establishment of bivouac campsites, and the impact of live fire ordnance. Other incidental impacts will also occur from such activities as cutting vegetation for garnishing camouflage nets.

The effects of military use on desert vegetation include:

- Reduction of shrub density.
- Reduction of canopy of individual shrubs.
- Reduction of diversity of shrub species.
- Reduction of diversity of annual and perennial herbaceous species.
- Reduction of numbers of annual wildflowers germinating and flowering in following years.
- Increase of density of weedy species.
- Impaired plant growth from increased dust.
- Impaired plant growth due to soil compaction.

- o Defoliation, flower, leaf and root injury, mortality.
- o Degradation of soil biota and nutrients.
- o Introduction of undesirable exotics.

Several generalizations can be made about plant damage from vehicle use in the desert. The damaging effect of desert use increases proportionately to the level of use; that is, the more vehicles using an area, the greater the damage to vegetation. Damage is intensified with repeated use: repeated use increases the period required for recovery, and repeated long-term use eliminates the potential for recovery. The most serious and widespread effects on vegetation appear to result from soil compaction. Impacts of soil compaction on vegetation must be considered long-term or even permanent, with recovery, if at all possible, requiring several decades to centuries of non-use. Figures 15 through 17 illustrate the increasing impacts on desert vegetation of continued vehicular use.

B. Rare Plant Species

Numerous examples of Mojave Indigo Bush (Dalea arborescens) have been found on Fort Irwin in canyon mouths and washes in the Granite Mountains along the Old Randsburg Road and near Garlic, Jack, and Cave Springs.

The effect of the proposed increase in use of Fort Irwin on the population of Mojave Indigo Bush will depend upon several factors including the distribution of the species on Fort Irwin, and the future level of vehicle use in areas where Mojave Indigo Bush is found.

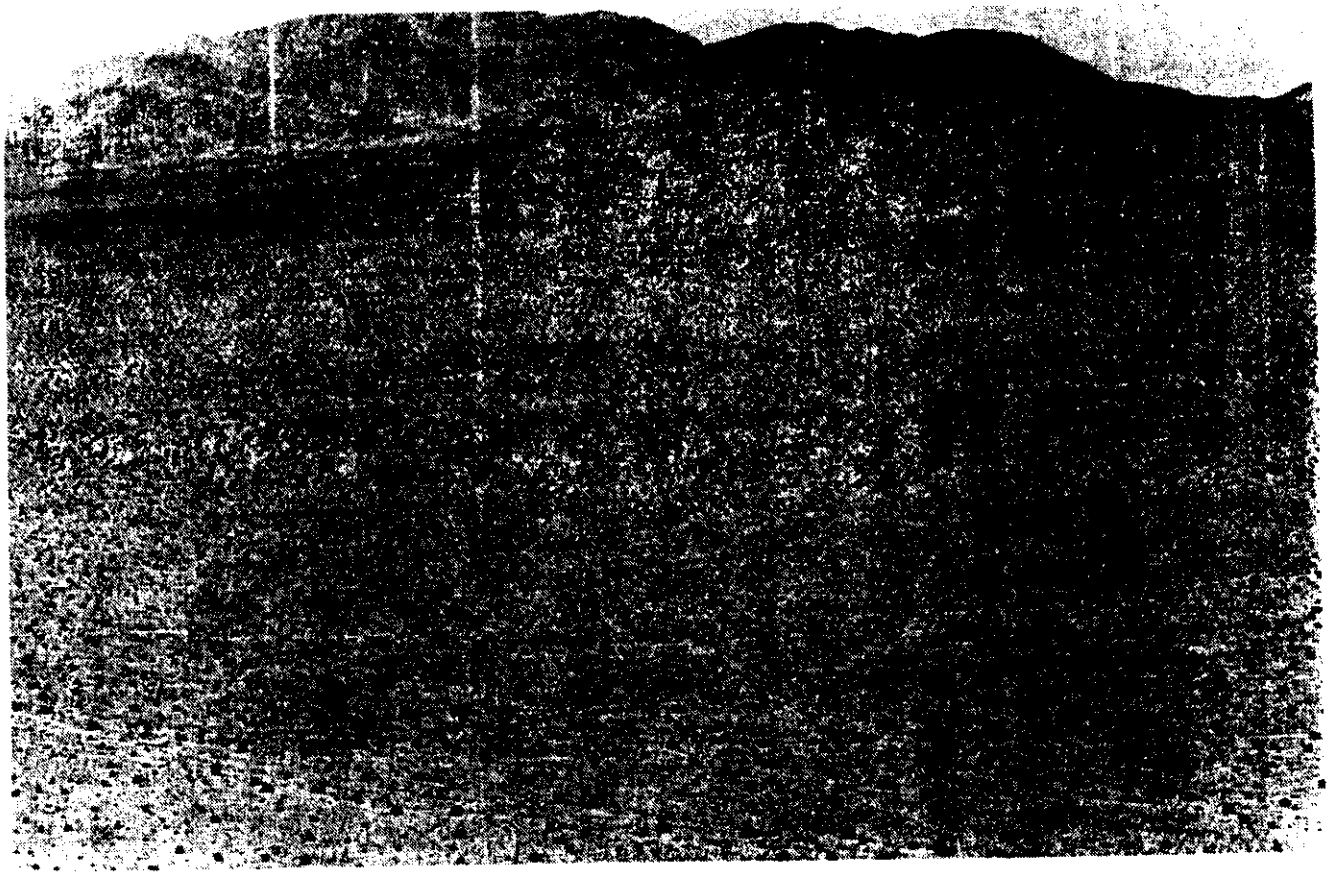


Figure 15. Vegetation After Minimal Traverses by Tracked Vehicles

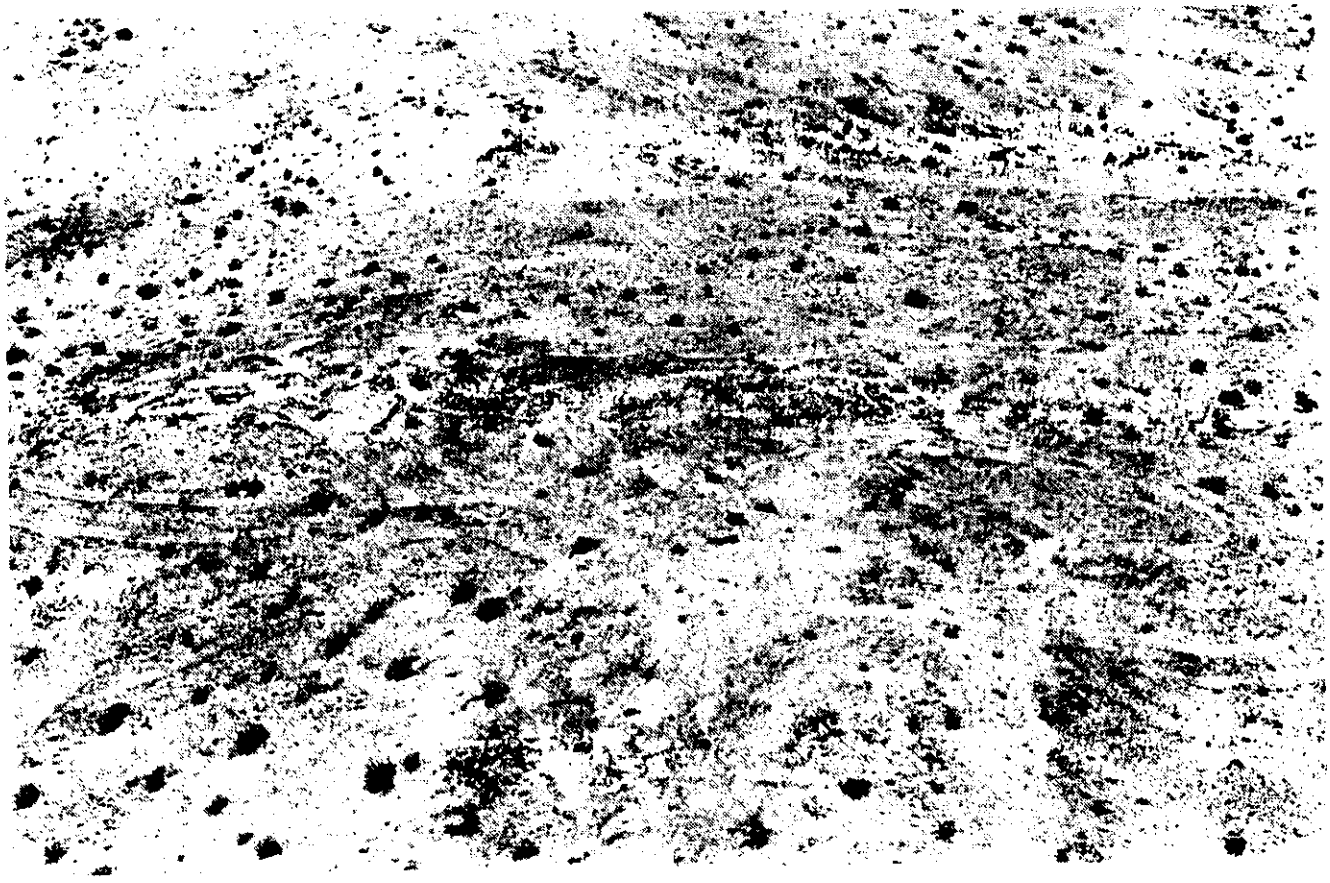


Figure 16. Rockpile Range

Figure 17. Trail Leading to North and East Ranges

To prevent damage to the Mojave Indigo Bush population, two steps will be considered in the Fort Irwin Master Plan. First, biological field investigations will be made to determine the geographical distribution. Second, using information on the distribution, a protection plan will be developed and implemented to restrict vehicle use in areas where Mojave Indigo Bush exists.

3.3.4 Wildlife

There are two direct ways in which wildlife populations are impacted by wheeled and tracked vehicle use in the desert. These are by immediate death from being run-over or being crushed in burrows under the ground's surface, and by destruction of habitat, which is by far the more serious threat to desert wildlife.

A. Habitat Destruction

Habitat destruction is the most serious effect of desert vehicle use on animal populations. The effects are wide-

spread and long-lasting. Loss of habitat -- food, cover, nests, and burrows -- reduces the carrying capacity of the land for animal life: as animal habitat decreases in the long run, animal populations will be reduced. For example, burrowing species will be unable to find cover and become easy prey for predators, or they may simply die of exposure. Likewise, nesting species finding a reduction or elimination of nesting sites will produce fewer young.

Destruction of habitat tends to affect all species in the natural community as the food chain is interrupted. Population changes of herbivorous species of insects, reptiles and mammals that experience a reduction in food supply will affect the food supplies of insectivorous and carnivorous species further up the food web (see Appendix Figure B-1).

Many herbivorous rodents, insects, and a few reptiles will be affected by a reduction in vegetation. In turn, reduction in populations of herbivorous insects will affect insectivores such as lizards, flycatchers, and some snakes. Predators, such as the grey fox, kit fox, badger, and coyote, dependent for food on populations of herbivores, insectivores, and other carnivores, will decrease in number as food sources become relatively scarce. These predators rely on the springs of the desert for water as well as for the available prey. To the extent that the areas around the springs continue to be protected, the wildlife frequenting these areas may be spared direct damage.

The feral burros may be affected by continued military activity at Fort Irwin, although because of their mobility and seclusive habits, they may continue to share their range with the Army. Desert bighorn sheep are not likely to share their range with the Army. There is good evidence to show that bighorn quickly abandon their habitat when vehicle disturbance occurs.

Soil compaction will directly and indirectly impact wildlife by collapsing burrows, making the soil more dense and harder to burrow in, and altering soil temperatures. Mortality of dormant reptiles through soil compaction by tracked and wheeled vehicles is a significant possibility.

Susceptible reptiles are: banded gecko, desert iguana, zebra-tailed lizard, Mojave fringe-toed lizard, leopard lizard, side-blotched lizard, desert horned lizard, western whiptail, desert tortoise, Mojave patch-nosed snake, glossy snake, western shovel-nosed snake, and sidewinder.

Many small mammals are also susceptible to crushing and burrow damage. Mammals that will be affected include ante-

lope ground squirrel, little pocket mouse, long-tailed pocket mouse, desert pocket mouse, Merriam's kangaroo rat, desert kangaroo rat, canyon mouse, grasshopper mouse, and desert woodrat.

B. Protected, Rare or Endangered Species

Of the protected, rare or endangered species that may be expected to inhabit portions of the Fort Irwin Reservation, five live on or beneath the desert surface. These are the Mojave ground squirrel, a rare species; the desert horned lizard, not officially listed as threatened or endangered, but identified by the Bureau of Land Management as locally scarce; the desert tortoise, protected as the California state reptile; the banded gecko, also identified by the Bureau of Land Management as locally scarce; and the desert kit fox, fully protected by the State of California.

Among other factors, the continued use of Fort Irwin for military maneuvers can be expected to place a stress on the present populations of these animals, principally due to habitat reduction. All five animals can be expected to inhabit the broad alluvial valleys of Fort Irwin which are to be used for training maneuvers.

The prairie falcon, considered a threatened or endangered bird by the U.S. Department of the Interior, may also inhabit Fort Irwin. Its flight capability better equips it to escape direct harm from military maneuvers, but destruction of habitat and reduction of population of prey species on Fort Irwin may be detrimental to the prairie falcon population. The prairie falcon is a species which is extremely sensitive to disturbance during the breeding-nesting season. The burrowing owl is on the Audubon Society Blue List of Diminishing Species.

3.4 ARCHAEOLOGIC AND HISTORIC RESOURCES

Areas of Fort Irwin offer a potentially fruitful field for chronological reconstruction of the aboriginal cultures of the Upper Mojave Desert and a detailed reconstruction of adaptation by pre-historic man to a changing environment with an explanation of the nature of those changes. Disturbance of such sites by vehicular travel or human activity, whether deliberate or inadvertent, destroys sequential evidence from which the professional archaeologist derives significant information. The nature of many of the artifacts is surficial and are therefore especially sensitive to disturbance.

A contract will be initiated by the Army, upon transfer of operational control from the State of California, for an archaeological field reconnaissance of the Fort and a necessary on-going evaluation of the cultural resources. These will follow the procedures established in Army Regulation 200-1, Chapter 8, entitled "Historic Preservation". Each site found will be evaluated against criteria necessary for inclusion in the National Register. Appropriate mitigation measures, including "salvage archaeology" whereby sites are well documented before removal of artifacts, will be recommended to protect the cultural resources from the destruction which could potentially occur.

A Proposed Program and Survey and Classification of Cultural Resources - Fort Irwin Military Reservation is included in Appendix D of this statement.

This preservation program will work to ensure that the potentially severe impact of brigade and joint training exercises on Fort Irwin's archaeologic resources will be minimized.

3.5 AESTHETIC QUALITY

Vehicular use of ridges, alluvial fans, bajadas and low hills for tactical maneuvers will create new scars across the landscape which will endure for varying lengths of time depending upon use, and will intensify existing surficial marks while lengthening the recovery time with each use to the point where a return to a natural state will not occur.

The extent of existing "tank trails" which can be considered permanent marks on the face of the desert is considerable. However, as the scenic quality of Fort Irwin has already been modified to a great degree through use, and as its visual sensitivity is low except for the Avawatz Mountain area, the National Training Center's impact on the Fort's aesthetic qualities will be minor.

An important consideration in weighing the potential permanent changes which will come about is that the area has already been modified to a great degree and that Fort Irwin is only visible to the general public from adjacent desert lands.

3.6 ELECTROMAGNETIC INTERFERENCE

Army and Air Force electronic warfare operations associated with the proposed National Training Center will increase over the present use of such equipment at Fort Irwin. Electronic warfare operations will include radio frequency jammers, enemy radar threat simulators, and electronic countermeasures to jam this radar.

Electronic warfare equipment envisioned for use could disrupt non-cable television and FM radio reception within a

20-mile radius of the emittor, depending on the terrain. This impact will be minor due to Fort Irwin's remoteness from any concentrated populations, yet it could affect the cantonment area.

The Department of Defense Electromagnetic Compatibility Analysis Center, Anapolis, MD, has performed on electromagnetic compatibility analysis of the Army/Air Force proposed operations at Fort Irwin and the NASA Goldstone Deep Space Communications Complex. ECAC has determined that by adhering to specified frequency assignments, operationg locations, and times of operation the proposed Army and Air Force radio, radar, and EW systems can operate at Fort Irwin without interfering with the Goldstone Complex. These studies will continue and monitoring of all electromagnetic emissions will become a permanent operation at the National Training Center to ensure compatible operations.

DOD and NASA are committed to maintaining an environment that is conducive to compatible operations. A Memorandum of Understanding between DOD and NASA is being prepared which will permit such compatible operations in the Mojave Desert Area. Coordination between DOD and NASA in this area will be effected through the DOD-NASA Mojave Coordinating Group. NASA operations will be integrated and coordinated with DOD operations on the basis of mutually defined procedures. Critical and sensitive NASA events will be accommodated through prior notification, coordination, and identification of specific electromagnetic interference sources. During NASA critical events, no activities will be conducted that have a potential of producing electromagnetic interference in the specific frequency spectrum used for the event. During NASA sensitive events, sources identified as causing interference at the Goldstone facilities will not be operated.

3.7 ENERGY

The Army projects the following level of vehicle fuel consumption per year during operations:

Jet fuels	-	30,000 barrels
Mogas	-	6,017 barrels
Diesel	-	33,994 barrels

THE CANTONMENT AREA

3.8 GENERAL

The development of a National Training center at Fort Irwin will mean that the services available to past residents will improve significantly. The physical deterioration which is inevitable with non-utilization will halt with constant use and maintenance. With the addition of 3,400 residents to the cantonment area, recreation facilities and social service functions will be reactivated, and the quality of life within the Fort Irwin community will improve considerably.

There are, however, two concerns whose effects will be exaggerated by the population growth anticipated. These are the use and availability of water, on which hinges all such activity in a desert environment, and the relationship between sound levels generated by military exercises and the community of people for which Fort Irwin will be home.

3.9 WATER

3.9.1 Water Supply

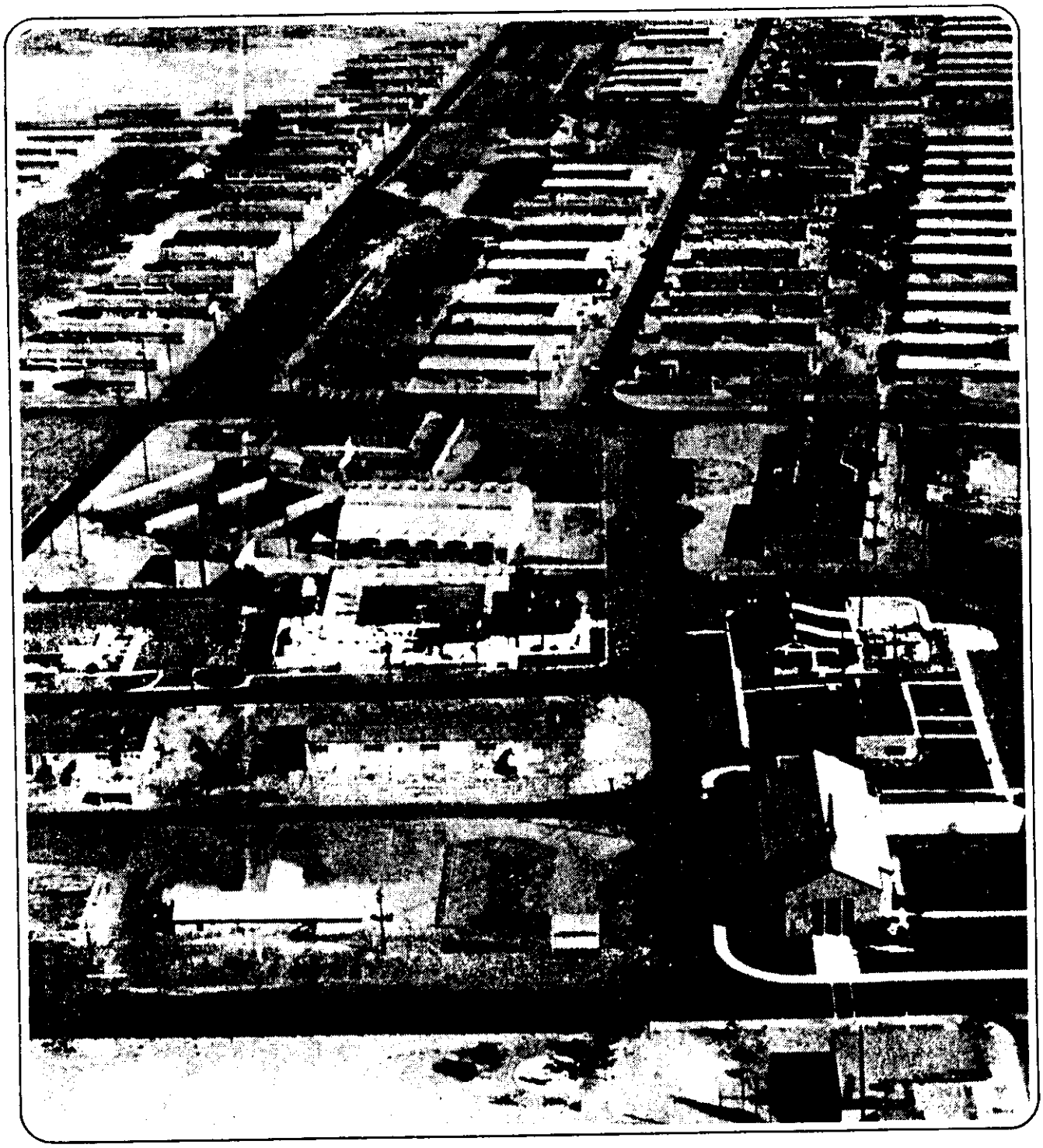
The proposed base mission change will result in increased water requirements that will have to be satisfied by increasing the production of the existing wells, or by finding additional water sources.

The yield capacities of the Irwin and Bicycle Lake basins are estimated to be adequate to satisfy projected water requirements for 130 years without recharge, or 224 years at estimated recharge levels.

See Appendix B for a detailed account of water supply projections.

The total combined pumping capacity of the wells at the Irwin and Bicycle Lake basins is estimated to be four times the required yearly pumping rate, and, therefore, additional wells should not be required.

As the water level in the two basins decreases, subsidence could be a problem, with tilting and warping of the ground surface, decrease in ground surface elevation, and cracking of the ground in the area of the subsidence bowl. To minimize subsidence problems, a basin management program, part of Phase II of the Fort Irwin Master Plan, will include controlling the pumping sequence of the wells to prevent excessive drawdowns around any one well.



The Cantonment Area

3.9.2 Water Quality

The average chemical quality of the water pumped from the wells in the Irwin and Bicycle Lake basins does not seem to have changed significantly since the wells were drilled. It is possible, however, that changes may occur as water levels decline through the years.

3.9.3 Sewage Treatment and Disposal

The existing sewage treatment facilities at the base are below current standards and are insufficient to handle the expected volumes of sewage to be generated when the population at Fort Irwin exceeds about 10,000 people. Upgrading of facilities to meet California water quality standards is required by 1980.

Sewage treatment facilities at the base are the equivalent of secondary treatment since effluent flows from a digestor into a series of 5 oxidation ponds. The facilities are sufficient to handle the expected volumes of sewage to be generated until the post population would exceed about 10,000 people. Since proposed use of the base will see only occasional use (every two to three years) by numbers in excess of 10,000 and then with most troops dispersed in field locations, there should be no adverse impact on facilities as they now exist.

Liquid and solid wastes generated in the field by personnel in training will be contained in pit or slit trenches. It is one intent of The Fort Irwin Master Plan to assure that wastes will be treated and disposed of in an environmentally safe manner, so that no adverse impacts occur to the groundwater or other resources of the area. The Plan will be coordinated with plans of the California State Solid Waste Management Board, and will include measures for disposal and storage of hazardous materials.

3.10 NOISE

The airspace above Fort Irwin and the other military lands within the general area provides the arena for a great deal of military air training activities with associated high noise levels. The exact degree and extent of impact from these air activities can be estimated only once specific exercises have been planned.

Noise within and around the maneuver areas and gunnery ranges can be expected to increase significantly from the natural state, as it does during National Guard training exercises.

Any sonic booms which might occur could be strong enough to cause structural damage and public reaction. The extent of these booms, again, can be determined only once specific conditions have been formulated for a particular exercise. The cantonment area and the Goldstone Deep Space Communication Complex are most likely to be affected.

In general, supersonic flight restrictions will be formulated and enforced. Noise abatement procedures, such as afterburner limitations, will be required.

The populace potentially most exposed to the sounds of both air and ground operations will be those people living in the cantonment area. People utilizing neighboring Bureau of Land Management lands for recreation purposes can also be expected to notice the sounds of air and ground operations.

A noise study, to be conducted by the Army Construction and Engineering Research Labs or similar consultants, will be included as part of the Fort Irwin Master Plan. Based on this study, additional restrictions to air operations as well as weapons training will be implemented within a special noise buffer zone centered on the cantonment area.

As residential and social service land uses are necessary within the cantonment area, insulation techniques which modify existing structures to diminish interior noise levels will be incorporated into the rehabilitations of buildings planned for the base.

3.11 ENERGY

Fort Irwin has 506 family housing units, 88 mobile home sites and 1,002 bachelor quarters to satisfy the demand of single military personnel. Space available is 2,378,000 square feet versus the estimated requirement of 1,600,000 square feet. Space not used would remain moth balled or turned over to National Guard to limit utility consumption. Propane, the single fuel, must be supplemented with more available fuel in the long range projections. This will require retrofitting. The type of fuel used with this retrofit will probably be oil with some coal.

The Army projects propane consumption at 144,396 MBTU per year during National Training Center operations, and electricity consumption at 12,033 megawatt hours.

THE BARSTOW AREA

3.12 ECONOMIC CONDITIONS OF THE BARSTOW AREA

The day-to-day operations of Fort Irwin as a National Training Center will depend on and substantially affect the primary and secondary employment sectors of the Barstow market area. Nearly half the population associated with the proposed action will require off-post housing and utilities. Educational opportunities, retail sales, social services, and recreation activities will be needed to supplement those offered within the post. While Barstow will undergo physical changes in land use due to population growth, the major impacts on Barstow will be to the socioeconomic environment.

3.12.1 Population

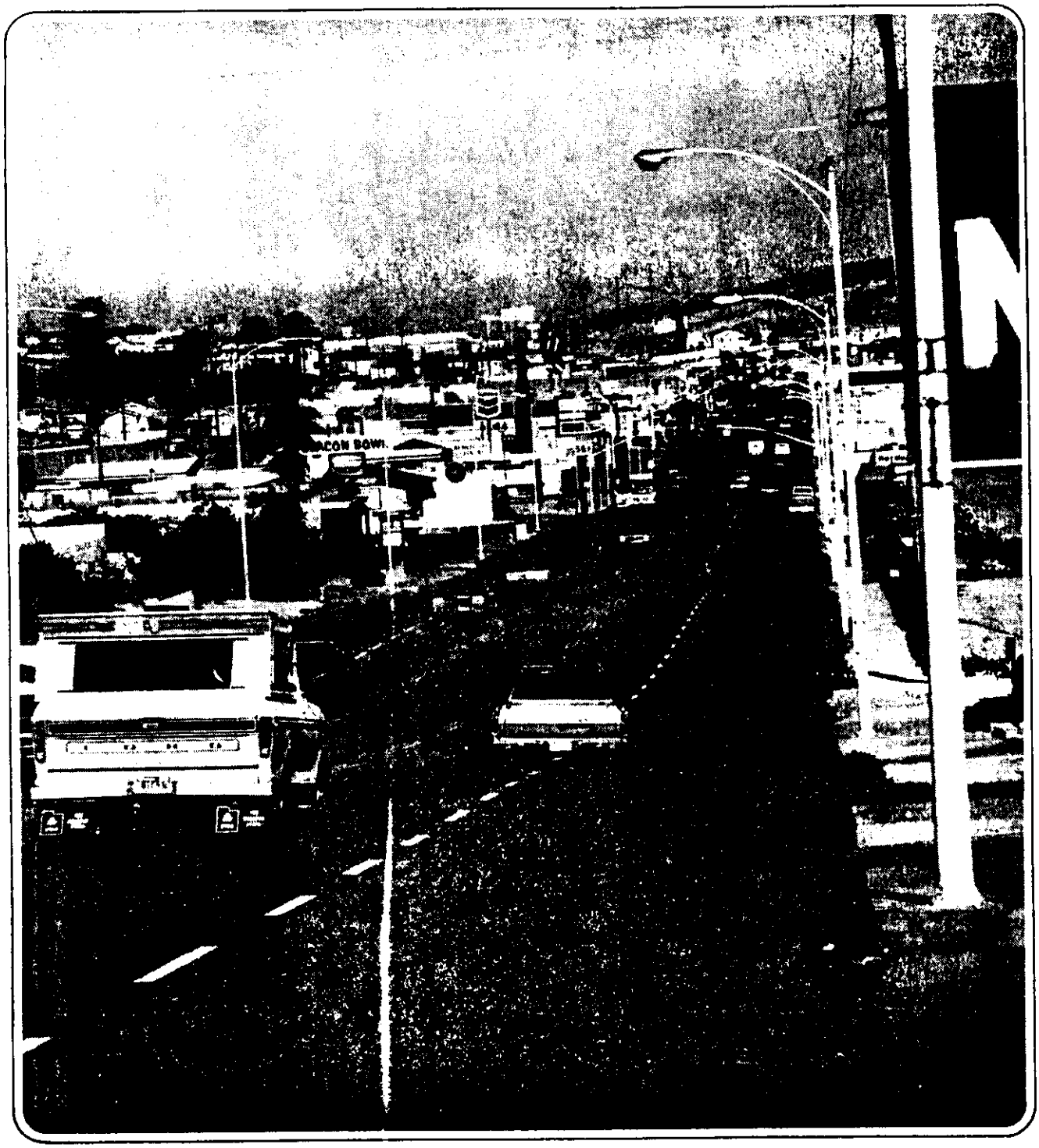
The change of mission at Fort Irwin will generate populations of approximately 3,400 on-post and 3,250 off-post. The Barstow market area, then, will be impacted as it would by any rapid influx of 6,600 people within its area of influence.

The fact that the catalyst for such an expansion is based on a core population unit of 2,374 military personnel would not be a new phenomenon within the area. Barstow has, in recent history, been to some degree a military town in its association as the regional center for an area hosting numerous military activities. Intermittently since 1940 it has directly served the population of Fort Irwin whose populations have, at times, equalled and exceeded those of the proposed activities.

What is a minor, moderate, major, adverse or beneficial impact will always be somewhat subjective, and often perception of impacts is more important in the decision-making process than quantitative data. Most observers would consider increases of 10 percent or more to be major or significant. Some of the projected changes in the Barstow area as a result of reactivation of Fort Irwin would be on the order of 10% and, therefore, can be considered significant.

3.12.2 Employment

The use of Fort Irwin as a National Training Center will generate employment in two phases: (a) construction and rehabilitation of facilities; and (b) operation of the installation. The construction phase is expected to occur in 1980 through 1982, and the operation phase is expected to begin in 1981 and mature by 1984.



The Barstow Area

A. Construction Phase

For San Bernadino County, employment generated by Fort Irwin construction and rehabilitation is projected as follows:

Employment Component	Average Employees/Year
Direct construction labor	247
Labor generated by purchase of materials and supplies	74
Labor generated by purchase of start-up equipment	2
Primary employees	323
Service industry employment generated by primary employees (Secondary employees)	210
Total employment in San Bernadino County generated by construction phase	533

Of the 533 employees to be generated in San Bernadino County, 366 are projected to residen in the Barstow Market area, with half of these new residents and half existing residents or dependents of Fort Irwin employees.

B. Operations Phase

For the Barstow market area, employment generated by Fort Irwin's operations phase is projected as follows:

Fort Irwin employees living on-post	1,628
Fort Irwin employees living off-post	1,064
Off-post employees generated by Fort Irwin procurement	30
Primary employees	2,722
Service industry employment generated by primary employees (Secondary employees)	715
Total employment in Barstow market area generated by operations phase	3,437

3.12.3 Generated Income

Construction of facilities and the operation of Fort Irwin will result in the generation of considerable income to the state, the county and the Barstow area.

During the construction phase, employment income to the county is estimated to be $7,924,000 per year. Of this amount, half, or $3,962,000 per year, is assumed to be spent in the Barstow market area for construction in 1980-82, excluding private housing market construction.

Total primary and secondary employment during operations will generate $37,701,500 annually in total income in the Barstow market area by 1984 and thereafter.

3.12.4 Generated Retail Sales and Sales Taxes

The taxable retail expenditure pattern for Fort Irwin and other operations employees is expected to be as follows:

	Income ($1,000's)	Retail Factor	Taxable Retail Sales
Fort Irwin On-Post	$18,427.0	10%	$1,842.7
Fort Irwin Off-Post	11,824.5	25%	2,956.1
Other Off-Post	7,450.0	25%	1,862.5
	$37,701.5		$6,661.3

This amount represents a per capita expenditure of $1,005 in taxable retail sales, which is considerably below state, county and city per capita expenditures for the total population. This is to be expected since military personnel satisfy many of their needs at Post Exchange and Commissary facilities.

Approximately one percent, or $66,613 is expected to be returned to the local market area from the State as the local share of tax receipts.

Uncertainties in the retail services sector include the independent nature of Army installations, which causes low per capita sales projections; the variability in cost of retail space and sales per square foot, and the capacity of existing retail space. It appears that the recent surge of retail space construction should be able to absorb the new sales to be generated by Fort Irwin operations.

3.13 HOUSING

On the Fort Irwin Reservation, 1,596 housing units will be required to house the families of National Training Center operations employees. Off-post, housing will be needed by 964 families engaged in Fort Irwin primary and secondary operations employment in 1980. The expected distribution of total off-post housing needs is:

120	Mobile Home Units
400	Apartment Units
344	Single-Family (moderate income)
100	Single-Family (moderate to high income)
964	Total Units

The construction of $40.5 million worth of housing, or an average of approximately $10 million per year over four years from 1981 to 1984 would generate secondary employment for approximately 200 construction workers. Possibly 100 of these would be newcomers to the region. These construction workers plus the estimated newcomers required for construction of the base are expected to be accommodated by the considerable transient facilities which exist in the Barstow market area.

The home construction industry in Barstow has been in a decline for almost 10 years. Projected growth of Fort Irwin will require increased output compared to recent experience; however, meeting the increased production is not considered a problem. Housing will likely be distributed over the market area, which contains a considerable inventory of vacant land.

The provision of single-family and mobile home units is not considered a problem. Provision of 400 multiple units will be the major concern. Only 338 apartment units were built in the city over the period 1960 to 1976. The major constraints are the financial return of apartment units to the private developer and his ability to obtain financing.

The Army will institute a housing assistance program, pending a Master Plan assessment. Provision of additional on-base housing, particularly for lower income families, assistance to families in purchasing off-base units, and spreading out the reactivation will be considered.

3.14 GOVERNMENT SERVICES

Of the 3,246 people living off-post to accompany reactivation of Fort Irwin, it is expected that many will move to the City of Barstow because of the proximity of services there, but this will depend greatly on the availability of housing at affordable prices.

The 3,246 persons may be fairly well distributed throughout the market area in cities and unincorporated areas, with resultant impacts depending on the actual distribution of the population with respect to a jurisdiction's fiscal and operational capacity.

3.14.1 County Special Districts

The County Special Districts in the study area vary considerably in functions, boundaries, assessed valuation, and tax rates. For most of the districts, the major impacts of the proposed project will arise from the need to supply additional services. The costs are presumed to be offset by the increase in assessed valuation from construction of homes and other facilities within the taxing area.

3.14.2 Health Facilities

Although the recently announced addition of a new Family Health Center in Barstow should alleviate the presently perceived shortage of pediatrics and obstetrics care the National Training Center will generate additional civilian population in Barstow which would further increase the demand for health care. Health services will be provided at the base by the military for its own personnel and their dependents.

3.14.3 Education

The number of school-age children to be generated on- and off-base by reactivation of Fort Irwin is projected as follows:

	On-Post	Off-Post	Total
Elementary (K-8)	396	492	888
High School	-	444	444
	396	936	1,332

If it is assumed that there are 25 to 30 students per class, then there will be a need for 16 to 20 elementary (K-8) classrooms in the Barstow area and 15 to 18 high school classrooms. Because the Barstow Unified School District is more than 3,000 students below its recent peak enrollment, the physical capacity to teach 1,332 students generated by the reactivation of Fort Irwin appears to be well within the District's resources. The grade school at the Fort should handle the 396 elementary students expected to be living on the post.

Financing of school districts throughout the State of California is questionable at the moment, due to recent property tax legislation and judicial action.

3.14.4 Parks and Recreation

There is a full range of social and recreational services now available or expected to be available within the Fort Irwin complex. The Barstow Park and Recreation District is also undertaking a significant improvement program. No adverse impacts are anticipated, and it likely that the Park and Recreation Department will realize an increase in operating budget proportionate to the anticipated population growth.

3.14.5 Public Safety

The influx of residents in the Barstow market area is expected to require the addition of one shift (three persons) to the Barstow Police Department and another shift to the San Bernardino Sheriff's Department.

The Barstow Fire District will require the addition of 2.4 full-time personnel and six volunteers.

Because of response time requirements, the fire facilities at Fort Irwin would provide backup for more serious fires in the Barstow area.

3.14.6 Transportation

The major transportation impact will occur over the Barstow-Fort Irwin access road. Approximately 1,064 Fort Irwin employees will need to travel the road to work each day, which is more than four times the existing number of commuters, excluding 92 vehicles used by Goldstone/NASA employees. Total traffic will depend on work shifts and carpooling. The projected traffic can be accommodated by the road, although present maintenance efforts may have to be increased. The ambient noise level and air quality along the road will be impacted by the increased traffic, as will traffic flow on the First Street Bridge within Barstow.

3.14.7 Water Supply

The provision of future water requirements in the Barstow market area is already a major concern and will certainly be strained by a change of mission at Fort Irwin, unless one of many presently proposed solutions is implemented.

Water available to the market area is limited and now considered approximately a twenty-year supply by the Mojave Water Agency. The implementation of a National Training Center at Fort Irwin, however, means the achievement by 1983 or 1984 of population levels presently predicted for 1990 with a subsequent loss in the expected life of the supply.

A comprehensive overview of Mojave Water Agency (MWA) districts is being prepared by the Agency in conjunction with the California Department of Water Resources. The study will take the form of a General Plan for the Agency, and is expected to be completed in December 1979. The Plan will include consideration of all suggested alternative, solutions to the provision of an adequate water supply in each of the agency's districts. The Mayor of Barstow is a member of the Technical Advisory Committee of the study team.

A critical analysis of the impact on water supply, however, depends on many assumptions, such as per capita consumption rates and conservation efforts in the future, plus the duration of drought conditions throughout the state. The City's report quotes a figure of 300 gallons per capita consumption, whereas typical design criteria is 150 gallons.

The 1,064 projected off-post families will require approximately 1,064 acre-feet of water per year under this assumption, representing an increase of 17.7% in the Barstow area's present rate of overdraft taken from storage in excess of the water added or recharged to the supply.

3.15 ENERGY

Fort Irwin is near a town, Barstow, that can absorb the utility requirement of off-post residents of 1.4 kwh per person peak demand or the annual electrical requirement of 10,000 kwh per person indicated in the 1974 energy use in the Barstow area. It did handle this requirement in 1970 when Fort Irwin was fully manned and there is no reason to believe this will not be true in the future.

4.0 RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

4.1 LAND USE PLANS

Fort Irwin was designated a permanent Class I installation in 1961, when it was still the Army Armor and Desert Training Center, and therefore it will remain a military reservation indefinitely.

There appears to be no major conflict between the use of Fort Irwin lands for a National Training Center and any federal, state and local land use plans as written.

4.1.1 Federal Lands

A. Armed Forces

The mission and subsequent usage of the reservation will be altered to some extent under control of the U.S. Army Forces Command. Some adjustments decreasing the activity level of use on the Fort Irwin Reservation by other units of the armed forces are probable.

For example, because of the proposed increase in armored battalion rotations by Forces Command, there may be some displacement of Joint Training Exercises carried out by Readiness Command and its tri-service members. Such exercises may have to be conducted elsewhere or discontinued, with Fort Irwin no longer so easily available for scheduling.

B. Bureau of Land Management

Public lands surrounding Fort Irwin are administered by the Bureau of Land Management of the Department of the Interior and are used for recreation or seasonal livestock grazing. Noise from air and ground operations may have aesthetic impact on recreationists on these lands. It may also diminish the wilderness potential of those roadless areas which the Bureau has identified that abut the reservation.

The Bureau has respected the existence of the Fort in its planning and has not proposed any changes to or controls on it. The Bureau has not included any part of Fort Irwin in its resource inventory work. It has, however, included coordination with the military in its planning efforts, even though those efforts stop at the reservation boundary.

C. Death Valley National Monument

Close to Fort Irwin, yet physically separated by the western reaches of the Avawatz Mountains and 1.5 miles of public lands, is Death Valley National Monument, encompassing 2,067,832 acres. The Monument is administered by the National Park Service. 1,908,000 acres of the Monument have been proposed as wilderness to the Congress by the Administration.

Under a new General Authorities Bill, the National Park Service annually forwards to Congress a listing of 12 areas appropriate for study for inclusion in the National Park System. The concept of a Desert National Park adjacent to Death Valley National Monument was included in 1977's listing. The lands envisioned are to the west of the Monument and do not affect Fort Irwin or directly adjacent lands.

D. Naval Weapons Center

The Naval Weapons Center's Mojave "B" - Randsburg Wash Test Range is used for overflight testing and consequently contains few structures or improvements. These lands are considered in compatible land use.

E. Goldstone Deep Space Communications Complex

The tracking antenna of NASA's Goldstone Deep Space Communications Complex could be susceptible to radio or electronic frequency interference such as that emitted by the Military's electronic warfare equipment (see paragraph 3.6). Initial studies by the U.S. Army Electromagnetic Compatibility Analysis Center have shown that Army and Air Force radio, radar, and electronic warfare systems can operate at Fort Irwin without interfering with the Goldstone Complex. These studies will continue to ensure that new equipment fielded at Fort Irwin does not result in interference. Coordination at the operating level, effected through the Department of Defense-National Aeronautic Space Administration Mojave Coordinating Group, will resolve scheduling and operational problems as they arise. The Department of Defense and National Aeronautic Space Administration are committed to maintaining an environment in the Mojave Desert area that is conducive to compatible operations.

4.1.2 State Lands

The Army has notified Congress of the intention to exchange by mutual agreement 21,120 acres of California Public School lands at Fort Irwin in accordance with Public Law 231, 26 July 1939. The General Services Administration is presently in the process of exchanging these lands with the State of California for equal value public lands.

4.1.3 San Bernadino County

The planning efforts of San Bernardino County do not encompass the review of any matters concerning the lands of military reservations. Those lands surrounding Fort Irwin have been categorized by the county as lands serving as a resource reserve area between the Fort and other land uses. The county's policies do include cooperating with Federal agencies where needs exist outside any military reservations for supportive land uses.

4.2 RELATED PLANS

4.2.1 Clean Air Act

Attainment of federal primary air quality standards for total suspended particulates must be achieved within three years after enactment of State Implementation Plans according to Parts 110 and 171 of the Clean Air Act as amended in 1977. Standards are being exceeded now at Fort Irwin. Much of the present concentration is due to wind blowing the desert surface, which may be considered a "natural" cause of air pollution. Heavy military use of the desert surface, however, will increase the susceptibility of the surface to wind erosion and therefore increase the "naturally caused" total suspended particulate concentration.

4.2.2 Clean Water Act

The Fort Irwin Master Plan will include wastewater control measures to ensure that groundwater is not affected by operations at the National Training Center, and that the base is in conformance with the Clean Water Act of 1977 and implementing regulations.

4.2.3 Resource Conservation and Recovery Act

The Fort Irwin Master Plan will address solid waste management and specifically hazardous materials storage and disposal to ensure compliance with Resource Conservation and Recovery Act regulations.

4.2.4 San Bernardino County Noise Policies

If anticipated military activities occur on a regular basis at the Barstow-Daggett Airport, the county's definition of the airport as "general utility" could be altered by utilizing aircraft which are not typical of current operations. This could affect the configuration of the "Special Study" land use zone established around the airport by expanding its dimensions outward accordingly.