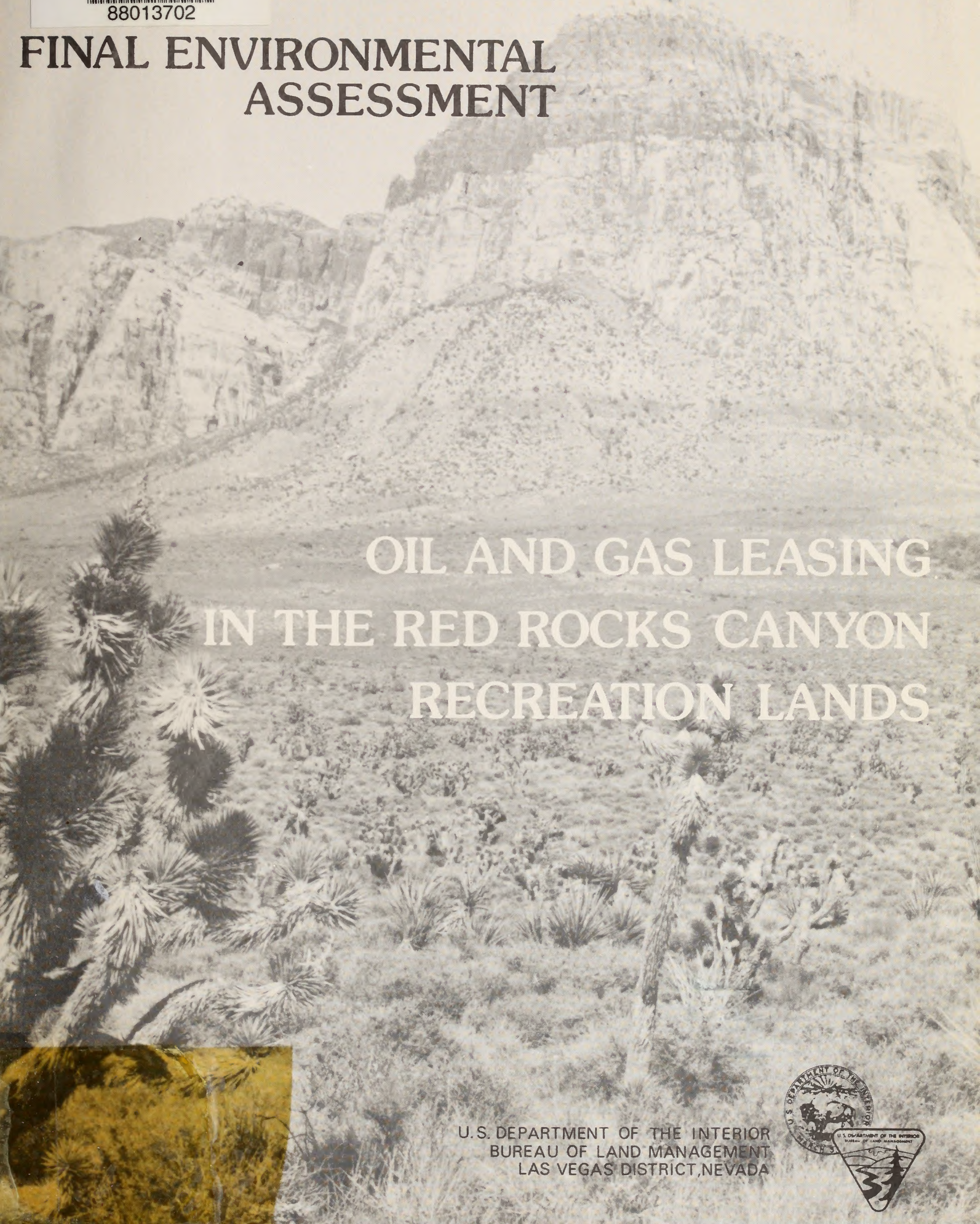
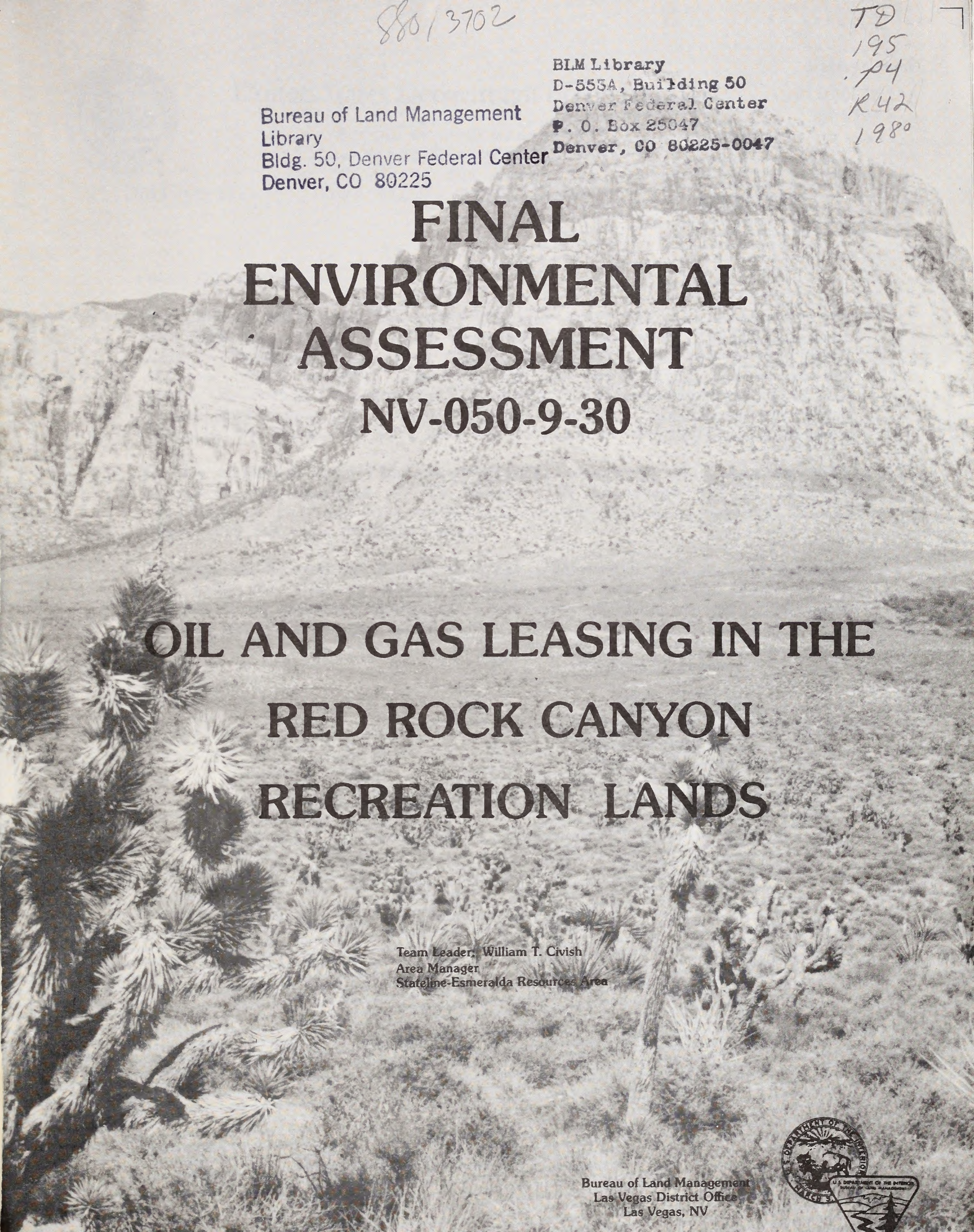
FINAL ENVIRONMENTAL ASSESSMENT



OIL AND GAS LEASING IN THE RED ROCKS CANYON RECREATION LANDS

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAS VEGAS DISTRICT, NEVADA



FINAL ENVIRONMENTAL ASSESSMENT

NV-050-9-30

OIL AND GAS LEASING IN THE RED ROCK CANYON RECREATION LANDS

Team Leader: William T. Civish
Area Manager
Stateline-Esmeralda Resources Area

Bureau of Land Management
Las Vegas District Office
Las Vegas, NV

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Las Vegas District Office
P.O. Box 5400
Las Vegas, Nevada 89102
(702) 385-6627

IN REPLY REFER TO
3100-RR
(N-050)

JUN 13 1980

Dear Fellow Citizen:

For several months the Las Vegas District staff has been re-working the Red Rock Oil and Gas Leasing Environmental Assessment issued in draft form in November, 1979. More than 2,000 persons responded to that first effort. Based on those comments, and our own internal review of the draft, we revised the document to insure a thorough examination of all issues surrounding the leasing proposal would be laid before our State Director, Ed Spang, who will make the decision on the lease applications.

We are confident this final environmental assessment will meet the high standards you demanded of the study. We encourage you to read it carefully so that you will understand how the decision, whatever it is, flows from the data presented here.

Finally, we express our thanks to those individuals, groups, and agencies who took the time to write or call us on this issue, which is so important to Southern Nevadans. Your contributions to the assessment process were welcome and helpful.

Sincerely yours,

Frank E. Bingham
Frank E. Bingham
District Manager

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MAP ERRATA SHEET

On all maps, roads in S½, sec. 22; E½, sec. 23; SW¼, sec. 26; NE¼, sec. 34; N½, sec. 35; T. 21 S., R. 58 E., should be shown as "Road Closed."

CHAPTER 1

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

INTRODUCTION

The Bureau of Land Management (BLM) has received 30 open land applications to lease oil and gas mineral rights on tracts within the Red Rock Canyon Recreation Lands (RRCRL). The applications cover all of the 60,910 acres of Federally-administered oil and gas rights in RRCRL. These leases are shown on the "Oil and Gas Applications and Leases" Map.

The RRCRL are located in Clark County, Nevada, on the east side of the Spring Mountain Range. They lie about 15 miles due west of the urban development in the Las Vegas Valley. Within the boundaries of RRCRL are some 2,200 acres of private lands (Oliver Ranch, Bonnie Springs, etc) and State of Nevada lands (Spring Mountain Ranch State Park). These private and state lands are not covered in the applications since the mineral rights there are not under Federal administration. Figure 1-1 shows the location of the RRCRL.

The area was formally named as the Red Rock Canyon Recreation Lands in 1967. At that time, it was segregated from uses and appropriation under certain public land laws and the general mining laws. However, because mineral leasing is a discretionary action, the RRCRL remain open to lease application.

The leasing of Federally-Administered oil and gas rights is a major BLM program. It gained momentum during the last decade as the United States was plagued by periodic energy supply shortages and long-term increases in its cost. The availability of energy, and its price, has significant social and economic implications for the American people, now and in the future.

The United States Government, under the Mining and Mineral Act of 1970, encourages private enterprise to develop domestic mineral resources. Public oil and gas resources may be leased under the Mineral Leasing Act of February 25, 1920, as amended. Preliminary investigation for oil and gas, normally consisting of geophysical work to locate probable oil-bearing geologic structures, can be conducted under Title 43, Code of Federal Regulations(CFR), Part 3045.

Until recently, there was little interest in exploring Southern Nevada for oil and gas. A number of relatively shallow wildcat wells (several thousand feet deep) were drilled in the past. None, to the BLM's knowledge, revealed significant oil reserves. Oil and gas lease applications increased rapidly in 1977 and 1978 with the growing interest in the "Overthrust Belt" which runs through Southern Nevada. By the end of 1979,some 2.1 million acres of the eligible 2.7 million acres in Clark County, about 77%, were either under lease or under application for lease.

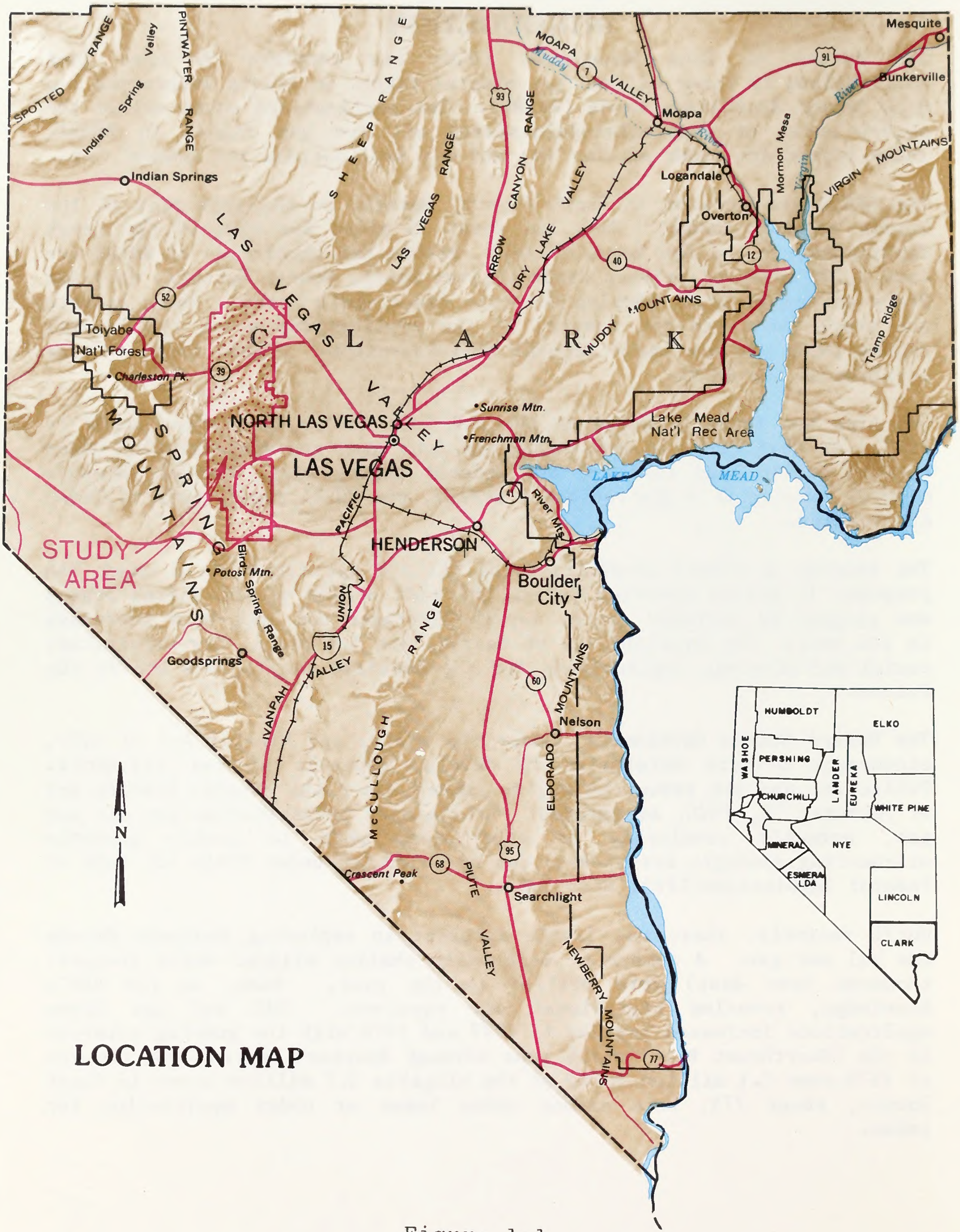
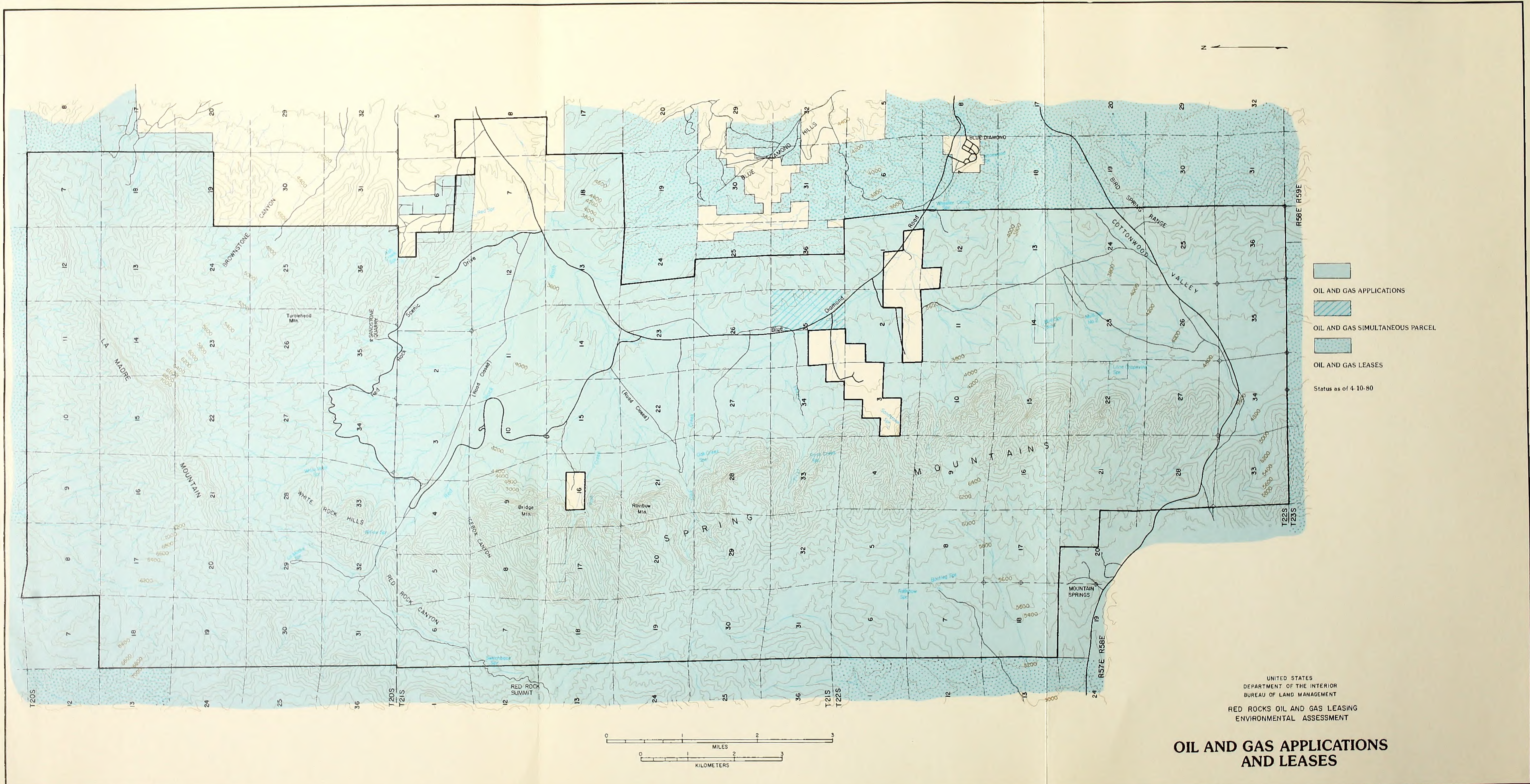

LOCATION MAP
STUDY AREA
CLARK
LAS VEGAS
NORTH LAS VEGAS
HENDERSON
Boulder City
Mesquite
Bunkerville
Moapa
Logandale
Overton
Indian Springs
Goodspring
Nelson
Searchlight
Toiyabe Nat'l Forest
Charleston Pk.
Potosi Mtn.
Sunrise Mtn.
Frenchman Mtn.
Crescent Peak
Lake Mead Nat'l Rec Area
LAKE MEAD
SPOTTED RANGE
Indian Spring Valley
PINTWATER RANGE
SHEEP RANGE
LAS VEGAS RANGE
ARROW CANYON RANGE
DRY LAKE VALLEY
MOAPA VALLEY
Muddy River
MUDDY MOUNTAINS
Mormon Mesa
Virgin River
VIRGIN MOUNTAINS
Tramp Ridge
LAS VEGAS VALLEY
SPRING MOUNTAINS
Bird Spring Range
UNION PACIFIC
IVANPAH VALLEY
McCULLOUGH RANGE
River Mts.
ELDORADO MOUNTAINS
PIUTE VALLEY
NEWBERRY MOUNTAINS
N
HUMBOLDT
ELKO
WASHOE
PERSHING
LANDER
EUREKA
CHURCHILL
WHITE PINE
MINERAL
NYE
ESMERALDA
LINCOLN
CLARK

Figure 1-1



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT

OIL AND GAS APPLICATIONS AND LEASES

Geophysical work has also increased. Since October 1976 the Las Vegas District has received 32 notices that exploration companies intended to "shoot" seismic lines. On Sept. 23, 1979 Mobil Oil Company, initiated an exploratory well on Morman Mesa, about 55 miles northeast of Las Vegas. The company planned to drill to 20,500 feet. The well was abandoned in May, 1980, at a depth of 19,562 feet.

The object of this interest, the Overthrust Belt, is a zone of folding and faulting believed to run from Alaska to Guatamala. It has a high potential for oil and gas reserves, according to geologists. As a result of early geologic activity in the West, the oil-bearing structures lie beneath other geologic structures which were thrust up and over them. To recover the resource, drillers must go deeper--10,000 to 20,000 feet--to strike oil. The theory has been borne out in the discovery of several fields in Wyoming and Utah.

Red Rock Canyon is believed to lie on the western edge of the Overthrust Belt in Southern Nevada. Ironically, one of the factors that causes the canyon to be perceived by Las Vegans and visitors as possessing unusual recreational values is the escarpment which is a striking example of the thrust-faulting which created the belt.

This perception of the canyon as possessing special resource values has been held by Las Vegans from the town's earliest days. With the expansion of the community after World War II, pressures for recreational use of the canyon grew. In the early 1960s efforts were made, unsuccessfully, to incorporate the canyon into the National Park System. A similar proposal for the Nevada Division of State Parks (NDSP) to assume responsibility for the area came to naught. In the mid-1960s a task force of Federal, State and local officials as well as interested private citizens was organized to develope a management scheme for the area. These efforts resulted in the 1967 dedication of the RRCRL and, in 1968, a master plan which called for rather extensive recreational development. Agreement was reached in 1969 between BLM and NDSP for joint management of the area, an arrangement that continues today.

In June, 1972, the BLM was faced with an apparent change of heart by many Las Vegans regarding the extent of development planned for the RRCRL. An environmental impact statement prepared on the 1968 master plan resulted in a new, less development-oriented management concept for the canyon. (N.B. <u>The Final Environmental Impact Statement on the Recreation Management Plan for Red Rock Canyon Recreation Lands</u> is referenced throughout this EA as "FES 75-98"). In mid-1977 a new master plan, jointly sponsored by BLM and NDSP, was announced. It called for minimal and environmentally-compatible development below the escarpment, and no development above it.

Against this background of continuing public interest in the RRCRL, a draft environmental assessment (EA) on the oil and gas leasing proposal was developed during 1979 and released for public review and comment in November of that year. Public and news media interest in the hypothetical conflict automatically set up by the lease applications was immediate and intense (See Chapter 10, Intensity of Public Interest).

Why hypothetical? Within the RRCRL there are other known resource values that could be in conflict with oil and gas exploration and development. However, there is virtually no data available to quantify oil and gas reserves, if any. The subsurface structures are relatively unexplored. The U.S. Geological Survey (USGS) classifies the RRCRL, like most of southern Nevada, as a "rank wildcat area," its lowest rating of a site's oil and gas potential based on data availability.

As a result of public comment on the draft and BLM's own internal reviews of the document, revisions that focused on three principal areaswere considered necessary: (1) assurance that the existing environment section was adequate to support impact assessment; (2) a section-by-section delineation of anticipated impacts based on known surface disturbances associated with oil and gas exploration/development activities, and (3) an informed development of mitigating measures available to offset the described impacts.

In addition, appendices (A and B) have been added which described, respectively, the post-lease actions of both USGS and BLM to assure oil and gas operations are environmentally compatible and the usual procedures followed by operators in developing an oil and gas field. Appendix A also discusses the "tiering" of environmental analysis inherent in the process of lease administration.

PROPOSED ACTION

To grant oil and gas leases within RRCRL which would allow exploration, development, production and related rights-of-way in the RRCRL. This would be accomplished in cooperation with the USGS as stated in the 1972 Secretary of the Interior Order No. 2948 and the Washington Office Cooperative Procedures (Department of Interior, 1975) concerning the division of responsibilities for the administration of onshore mineral leasing laws.

The proposed action includes the following:

--To allow preliminary investigation, particularly seismic-type geophysical surveys under 43 CFR 3045.

--To issue oil and gas leases in the area by the authority of the Mineral Leasing Act of February 25, 1920, as amended.

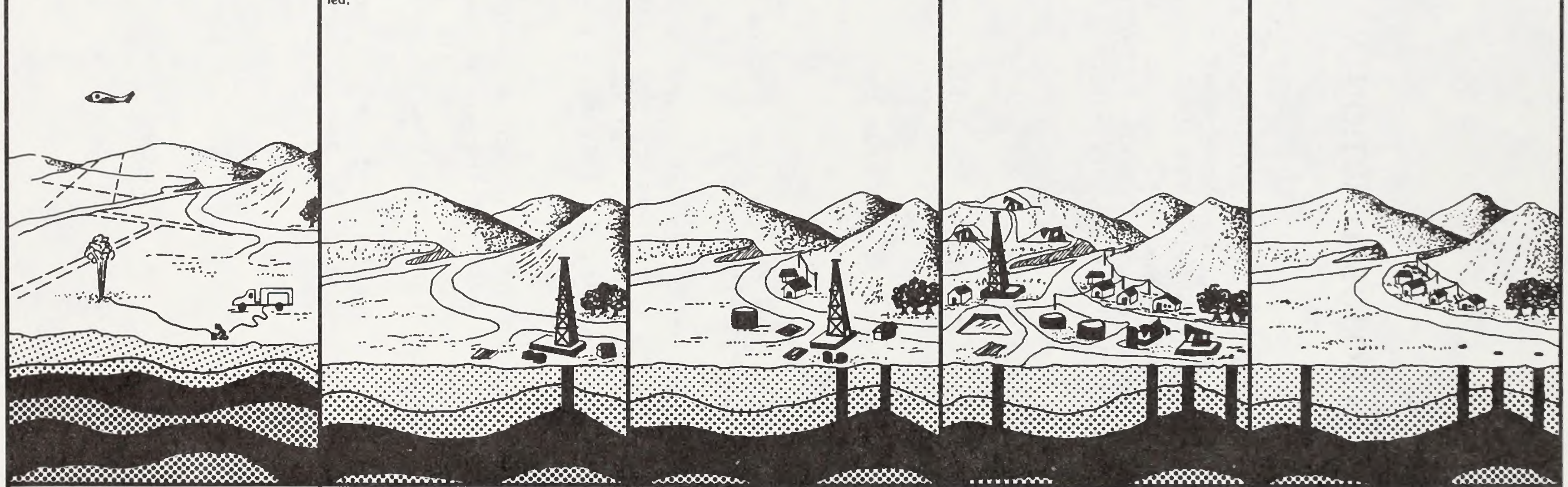
--To allow exploration for oil and gas, and subsequent development and production of any found under the Mineral Leasing Act of February 25, 1920.

--To issue support rights-of-way as necessary for oil and gas pipelines in the area by the authority of Section 28 of the Mineral Leasing Act of February 25, 1920 as amended by Title I of the Act of November 16, 1973 (Public Law 93-153, 87 Stat. 576).

--To issue new rights-of-way necessary to support production, conservation, and transportation of the oil and gas resource. The authority is contained in Section V of the Federal Land policy and Management Act (FLPMA) of 1976.

Figure 1-2 shows the sequence of operations in an oil and gas field. The analysis in this EA is made according to the phases shown.

PHASE I	PHASE II	PHASE III	PHASE IV	PHASE V
PRELIMINARY INVESTIGATION (Unknown Geological Structure) Preliminary investigations are carried out over large areas from aircraft and on the ground.	EXPLORATION If the preliminary investigaions indicate that geological structures may contain oil and gas, a lease is obtained and an exploratory well is drilled.	DEVELOPMENT If oil and gas are discovered during the exploration phase and recovery is economically feasible, the field is developed for production.	PRODUCTION The production phase involves operation and maintenance of the field and recovery of oil and gas.	ABANDONMENT When the field is abandoned, equipment is removed, wells are plugged, and the surface is reclaimed.
Airborn Surveys Surface Surveys Geochemical Surveys Stratigraphic & Other Mapping Geophysical Surveys Explosive Method Thumper Method Vibrator Method Gravity & Other Methods Geological Surveys	Wildcat Well Drilling Access Roads Camp & Buildings (Remote Areas)	Development Drilling Access Roads Pipelines Utility Lines Separators Storage Tanks Camp & Buildings	Continued Drilling & Development of Field Pressure Maintenance System Disposal of Waste Secondary & Tertiary Recovery System Communication & Production System Communities	Equipment, Buildings & Facilities Removal Field Cleanup Well Abandonment & Plugging Eliminate Hazard Surface Reclamation Landscaping Reseeding Other Erosion Control



SOURCE: U.S. Department of the Interior, BLM, 1972.

Figure 1-2. Phases or Sequence of Operations in an Oil and Gas Field.

ALTERNATIVE

No action. Under this alternative the BLM would deny oil and gas lease applications within the RRCRL.

RATIONALE FOR ALTERNATIVE DEVELOPMENT

The National Environmental Policy Act (NEPA) requires that the impacts of reasonable alternatives to the proposed action be assessed. Within the proposed action are at least 30 reasonable actions: granting one through 30 the applied-for leases. However, delineating each of those as a separate alternative would result in a cumbersome and repetative document.

In dealing with the proposed action, assumptions are made (see below) that allow the full range of impacts over the entire RRCRL to be addressed. Moreover, the impacts are delineated by quarter-section on a matrix in that chapter. This method of dealing with the proposed action results in the display of impacts and mitigating measures associated with each of the 30 lease applications. In essence, therefore, the proposed action shows not only what happens with that assumed maximum amount of surface disturbance, but also with the range of lesser surface-disturbing alternatives beneath it. It allows the decision maker to choose from the full range of possible actions knowing full well in every case what the environmental consequences are.

Denying the leases completes the spectrum of possible actions and satisfies the NEPA requirement for a "no action" alternative. While BLM would, in fact, take an administrative action (the denial of the applications), it takes no action within the terrestrial ecosystem being analyzed in this study, the RRCRL.

ASSUMPTIONS AND ANALYSIS GUIDELINES

To analyze certain impacts, the amount of surface disturbance must be identified. Since little is known about the subsurface geology of RRCRL, assumptions must be made based on exploration and development data from other areas. BLM's Kemmerer Resource Area in western Wyoming is the area where the bureau has the highest amount of Overthrust Belt exploration, development, and production. The Kemmerer experience was used as a starting point in developing analysis assumptions for the RRCRL.

From 1884 to 1977 a total of 424 oil and gas wells were drilled in the Kemmerer area. Of the 424 drilled, 85 about 20% were producing wells. There are some three million acres in the Kemmerer study area . The ratio of drilled wells to total acreage is about one to about every 7,000 acres. It was predicted that, due to increased exploration activity, an additional 3,000 wells may be drilled in the area between 1977 and the year 2000 (Kemmerer O & G EA, 1979). The total number of drilled wells in the entire Kemmerer study area would then be approximately 3,500. This computes to an average of one well to every 850 acres.

Applying that average to the Red Rock study area (60,910 acres), there could be as many as 72 wells drilled within the study area over a 25 year period, if oil and gas reserves are discovered in the area.

The correlation of the RRCRL and the Kemmerer study areas is not, at this point in geologic data availability, entirely appropriate. Kemmerer has proven oil and gas discoveries. The RRCRL is classified well below that as a "rank wildcat area." To compensate for that disparity, and lacking local data, the number of wells used in this analysis will be reduced by about half to 35.

In this analysis, 20 of the projected 35 wells would be developed during the first 15 years and the other 15 wells over the remaining 10 years, to account for market fluctuations.

Table 1-1 describes the assumed surface area disturbed during the 25 year period.

TABLE 1-1

Assumptions Regarding Impacts During the Term of the Assessment (1980-2005)

Activity	Quantity	Area of Disturbance (Acres)	Total Acres Disturbed
Seismic Lines (a)	25 lines (6.5 Miles/Line)	1 Acre/Mile	160
Drill Pads(b)	35 Pads	5 Acres/Pad	180
Tramroads (b)	44 Miles	25 ft width (50 ft right-of-way) 5 Acres/Mile (Includes Material pits & Borrow Pits)	220
Grand Total of Acres Disturbed			560 acres

Note: These figures do not reflect any rehabilitations or revegatation. These figures are estimated and or averaged. The average wildcat tramroad was 1.25 miles from the Kemmerer Resource Area. It is not possible to quantify any other disturbances (i.e. pipelines, powerlines, etc.) because comparative data is not available..

a) Data was obtained from seismic line done in the Morman Mesa-Virgin River Area in the Las Vegas District.

b) Road width and areas of disturbance were calculated from data and on-the-ground observations by Kemmerer Resource Area personnel.

It should be stressed at this point that these assumptions are made based on leasing and developing the entire Red Rock study area. If areas are found unsuitable for oil and gas leasing through this environmental analysis, then the resultant impacts would be reduced proportionally.

CHAPTER 2

EXISTING LAND USE PLANS

EXISTING LAND USE PLANS

BLM

From Stateline Planning Unit, Management Framework Plan, Step III, dated June 13, 1975.

Lands

No decisions applicable.

Wild Horses and Burros

Decision: "Establish a wild and free-roaming horse/burro range on the Spring Mountain Allotment and develop a horse/burro management plan for the area. The allotment can be designated by the District Manager as the habitat management plan is completed." The proposed action does not appear to conflict with this decision.

Decision: "Gather and move the wild horses from the Wheeler Slope Allotment to the Spring Mountain Allotment. A short fence will be required in Wheeler Pass to preclude reinvasion by horses." The proposed action does not appear to conflict with this decision.

Decision: "Gather the wild free roaming horses/burros presently on the Wheeler Wash Allotment and transfer the animals to the Spring Mountain Allotment." The proposed action does not appear to conflict with this decision.

Range

No decisions applicable

Recreation

Decision: "Designate the North and South Forks of Pine Creek, the Cottonwood Cholla area and the Potosi Barrel Cactus Area as Natural Areas." The proposed action could conflict with this decision.

Decision: "Repair or replace authenticated markers, locate access points and provide interpretive facilities on the Old Spanish Trail." The proposed action could conflict with this decision.

Decision: "Designate the red Rock Escarpment and the Mount Stirling Range as primitive areas. Withdraw the Mount Stirling range from the general mining and land laws. Protect resource values through special stipulations in mineral leases." The proposed action could conflict with this decision.

Decision: "The Highland Range, North McCullough Range, LaMadre Range, South McCullough range and West Charleston area will be managed in their present state until primitive values can be determined." The proposed action could conflict with this decision.

Decision: "Close the RRCRL to off-road vehicle use." The proposed action appears to conflict with this decision.

Minerals

Decision: "Areas that are critical habitat and the botanic areas RASbo003 Potosi Barrel Cactus, RASbo012 Cottonwood Cholla, RASbo005 Paiute Valley Joshua Tree Forest, and RASbo010 Kyle and Lee Canyons should also be closed to surface occupancy of oil and gas and geothermal leasors. ....(For a detailed list of areas requiring special stipulations see N-7640, EAR covering oil and gas and geothermal leasing in the Stateline Planning Unit.)" The proposed action could conflict with this decision.

Wildlife

Decision: Intensive inventories will be accomplished for the following species: desert tortoise, gila monster, praire falcon, desert bighorn sheep, mountain lion, gambel's quail, morning dove, mule deer, and antelope. The proposed action appears not to conflict with this decision.

Decision: "Revise and update the following HMPs in the following priority: Ash Meadows-N5-WHA-A1, Red Rocks-N5-WHA-T10, Highland Range-N5-WHA-T4." The proposed action appears not to conflict with this decision.

Decision: "Special HMPs will be completed as the need arises for certain habitats, like prairie falcon nesting sites in Las Vegas Wash and the Red Rocks." The proposed action appears not to conflict with this decision.

Decision: "Water coordination plans will be developed for areas where wildlife use is overlapped by domestic stock and wildhorse and burros. These areas are Highland, McCullough, Spring Mountain, Red Rock and Eldorado Habitat Areas." The proposed action appears not to conflict with this decision.

Decision: "Where natural and livestock waters do not exist in the Spring Mountains, McCullough, Eldorado, Highland and Red Rock Ranges, add artifical watering devices for big game, small game and non-game animals. Specific sites will be identified in Habitat Management Plans. During construction stage, take care not to damage fragile watershed areas." The proposed action appears not to conflict with this decision.

Decision: "Do not allow new recreational developments (such as campsites, multiple picnic sites, motocycle-hiking trails, scenic drives) within a 1/4 mile of permanent bighorn waters." The proposed action appears not to conflict with this decision.

Decision: "Close the Red Rock crucial bighorn habitat in the Red Rock area (as shown on MFP Step III overlay) to oil, gas, and geothermal exploration and leasing.

Applications in the following areas, will require an on the ground site-by-site invesitgation by district personnel prior to granting of the application. Exploration of these areas will require special stipulations that will be designed to mitigate adverse impacts on the wildlife species involved.

a. Crucial bighorn habitat in the McCullough and Highland Ranges.
b. Crucial elk/deer habitat in the Spring Mountains.
c. Prairie falcon habitat in Las Vegas Wash.
d. Pahrump killifish habitat - Manse.
e. Areas surrounding desert pupfish habitat identified as closed in Decision #15.
f. Crucial elk habitat in addition to that discussed above.

The proposed action appears to conflict with this decision.

Decision: "Protect, and where necessary improve, riparian habitat and other important areas of cover for small game and non-game animals. Some important cover areas exist in the Red Rock, Highland, Spring Mountain, and McCullough Ranges and around Warm Springs in Ash Meadows. Intensive inventories and HMPs will reveal specific areas that need protection or revegetation." The proposed action could conflict with this decision.

Forestry

Decision: "Allow juniper post harvesting throughout the planning unit except in the RRCRL and the proposed Mount Stirling and South McCullough Primitive Areas." The proposed action appears not to conflict with this decision.

Decision: "Allow the harvest of overmature or dying pinyon pine or juniper trees for firewood throughout the planning unit except in the RRCRL, the proposed Mount Stirling and South McCullough Primitive Areas and within the visual influence zones of Lee and Kyle canyons." The proposed action appears not to conflict with this decision.

Watershed

Decision: "Protect fragile watershed areas by restricting certain uses which disturb the soil surface and vegetative cover. Competitive ORV events in these areas (See Recreation MFP overlays) will be restricted to designated roads, trails, courses and washes. All other fragile areas are restricted or closed to competitive ORV events." The proposed action could conflict with this decision.

OTHER BLM MANAGEMENT DECISIONS

Based on the information contained in FES 75-98, the Secretary of the Interior in 1976, issued a decision which selected Alternative IV as the management direction for the RRCRL. The following is a description of Alternative IV:

"D. Analysis of Alternative IV

Restricted development along existing corridors below the escarpment and maintenance of the natural environment elsewhere.

1. Description (Alternative IV)

This alternative represents a departure from the previously discussed alternatives which were derived from the proposed action.

The management concept behind this alternative is to maintain maximum environmental integrity in the area while providing for people use in a natural environment. Recreational facilities would be provided that would enable users to enjoy and appreciate the outstanding natural features of the Red Rocks. It would discourage intensive use of defined critical wildlife and vegetation areas and keep developments from distracting from the natural features.

Development would be limited to existing access corridors from which visitors would be able to fan out along a number of trails. Public use facilities would be away from the escarpment and the area above the escarpment and the area between the escarpment and the corridors would remain in a natural condition. Existing corridors include the Blue Diamond Loop Road and Segment A of the Red Rock Scenic Drive."

The proposed action could conflict with this decision.

NEVADA DIVISION OF STATE PARKS (NDSP)

The NDSP has no planning documents for the RRCRL in general or the state park owned and managed lands in specific (R. Orr, personal communication, June 1980). Mr. Orr indicated that NDSP are in the preliminary stages of beginning to develop a site development plan for Spring Mountain Ranch. No completion date is available. Although no specific planning documents exist, the NDSP has received approximately \$3.7 million for the acquisition of Pine Creek and acquisition of Spring Mountain Ranch from the Land and Water Conservation Fund. Section 6f(3) of the Land and Water Conservation Fund Act of 1965, as amended, states:

"No property acquired or developed with assistance under this section shall, without the approval of the Secretary, be converted to other than public outdoor recreation uses. The secretaary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan (SCORP) and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least fair market value and of reasonably equivalent usefulness and location."

Goals 1-A, 2-A of the 1977 Nevada SCORP, relate to providing recreation facilities near population centers. The RRCRL are located approximately 15 miles from Las Vegas. NDSP's management direction, then, is one of recreation.

Clark County

In 1977, Clark County developed a Comprehensive Plan which indicated that the use of the RRCRL should be recreational. The zoning recommendation was for open space which is in conflict with the oil and gas leasing in this proposed action.

CHAPTER 3

DESCRIPTION OF THE EXISTING ENVIRONMENT

DESCRIPTION OF THE EXISTING ENVIRONMENT

NON-LIVING COMPONENTS

CLIMATE

Precipitation and Humidity

The RRCRL are in the "rain shadow" of the Sierra Nevada Mountains. Semi-arid to arid conditions prevail in this area. Rainfall increases with elevation. Nearby Las Vegas with an elevation of 2,165 feet, has a mean annual precipitation of about four inches. Little Red Rock, at 3,800 feet, has about seven inches. Areas above 7,000 feet have a mean annual precipitation of about 12 inches.

Most of the precipitation from October to June is moisture from the Pacific Ocean. Short duration thunder storms from the Gulf of Mexico may occur during July, August, and September.

There is a significant variation in rainfall from year to year in Southern Nevada. In Little Red Rock, January rainfall varied from a trace in 1968 to 5.67 inches in 1969. (National Oceanographic and Atmospheric Administration (NOAA), 1968-1969). Table 3-1 demonstrates this fluctuation.

Temperature

Daily temperature fluctuations of more than 30° Fahrenheit (F) are common. Short term records indicate an annual average temperature below the Red Rock escarpment of 62°F with highs of 110°F and lows of 5°F. Temperatures on top of the escarpment, because of a 3,000-foot elevation difference, decrease to an annual average of 55°F with highs of 98°F and lows of about 0°F (NOAA, 1955-1978).

Little Red Rock has a growing season of about 230 days.

TABLE 3-1
Inches at Little Red Rock
(T20S, R50E; Elevation 3,800 Feet)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1966	T	.26	.05	.09	T	.03	.41	.93	.69	.66	.21	5.05	8.41
1967	.74	T	.06	.48	.27	.15	.75	.47	1.58	.00	1.92	1.05	7.47
1968	.19	.29	.38	.23	T	.58	1.69	.21	T	.02	.14	.42	4.17
1969	5.67	2.48	.97	.13	1.43	.12	.87	.91	.51	.37	.18	T	13.64
1970	.08	1.28	.73	.05	T	T	.82	.95	.00	.01	.40	.21	4.53
Average 1966-70	1.34	.86	.44	.20	.34	.18	.91	.69	.56	.22	.57	1.35	7.64

SOURCE: NOAA Climatological Summaries for Nevada

AIR QUALITY

Responsibility for air quality monitoring and regulation for the RRCRL lies with the Clark County Health District Air Pollution Control Division. A memo from the Air Pollution Control Division to the BLM's Las Vegas District Manager, dated November 28, 1979, discussed current air quality in the Red Rock area. It stated: "Air quality standards for carbon monoxide, total suspended particulates, nitrogen dioxide and sulfur dioxide are not exceeded, nor even approached, based on our knowledge of the emissions in the area. Under certain summertime conditions, there could be an intrusion of significant ozone levels which may approach or exceed the ambient ozone standard. This ozone would be a result of the emissions of automobiles and stationary sources within the Las Vegas Valley."

The U.S. Environmental Protection Agency has established national ambient air quality standards for major pollutants. The Las Vegas Valley is designated an air quality non-attainment area because it does not conform to all of the national air quality standards.

Most of the Red Rocks is within the Las Vegas Valley Air Quality Non-attainment Area. However, RRCRL air quality is usually better than in the rest of the valley.

The major sources of air pollution in the RRCRL are wind blown dust and automobile emissions blown in from the Las Vegas Valley. Automobile use within the Red Rock area contributes to pollution but is not sufficient to violate air quality standards. Dust from the Flintkote gypsum plant is a minor problem because recent pollution control devices have reduced stack emissions to about eight to ten pounds per hour. This dust is usually blown away from the RRCRL.

Wind blown dust consists of dust from unpaved roads and trails in the Red Rocks, dust from undisturbed areas of the desert, and dust from construction related to the Red Rock Visitors Center. The natural total suspended particulate matter from the undisturbed desert is about one-half of the Federal Primary Particulate Standard of 75 micrograms per cubic meter (ug/m3).

TOPOGRAPHY

The Red Rock Escarpment, a series of near vertical sandstone cliffs, rising more than 3,000 feet above the valley and extending most of the length of the RRCRL, is the dominant topographic feature in the Red Rocks. Many narrow, y-shaped canyons cut deeply into the escarpment. La Madre Canyon is accessible through Rocky Gap and drains into Red Rock Wash. La Madre Canyon does not contain much area within slope limits of 0 to 25%.

The west slope of the escarpment consists of limestone foothills heavily divided into hills and ridges which drain westerly into Lovell Canyon.

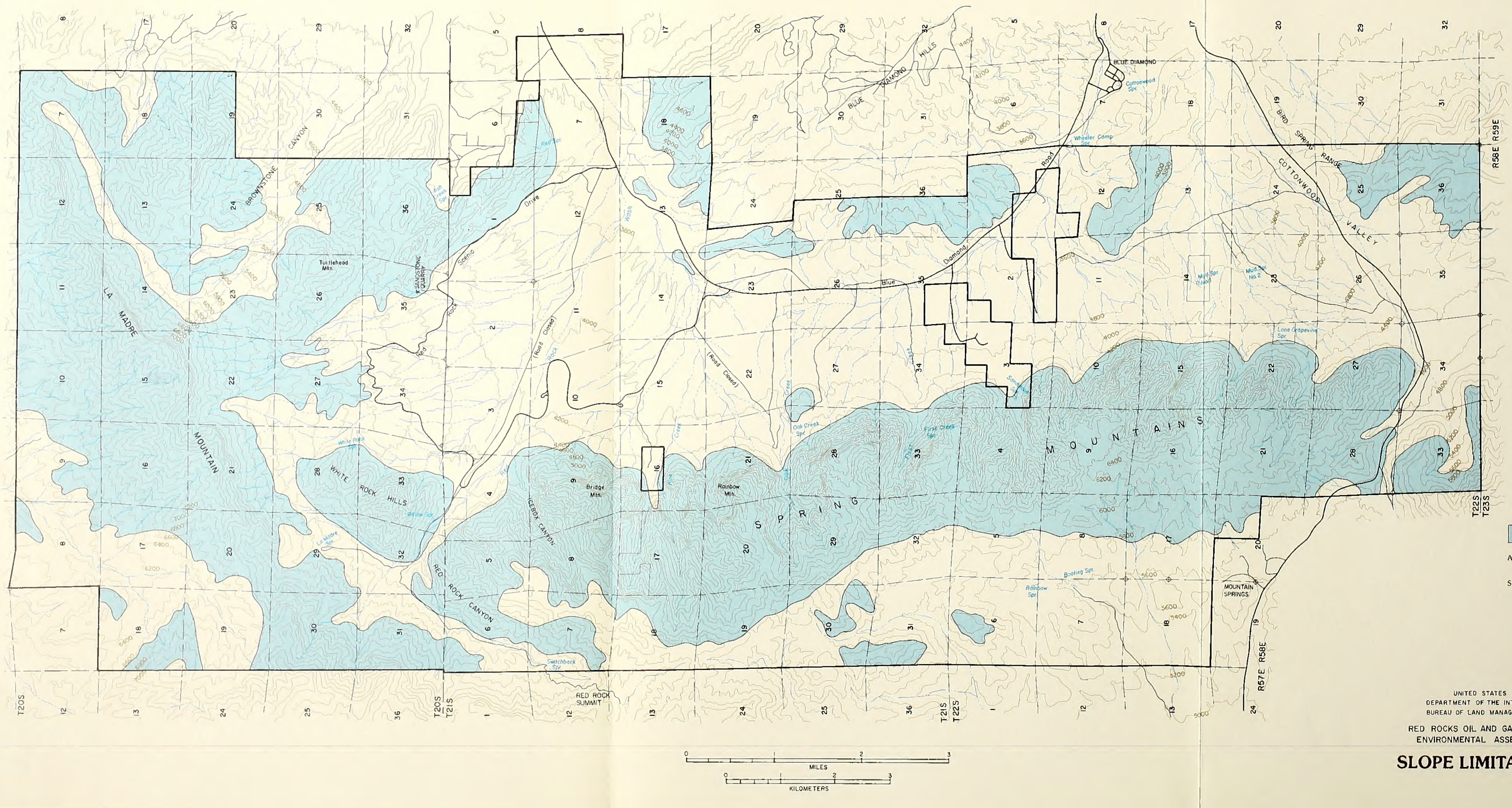
The east side of the escarpment is mostly flat, 0 to 15% slope, and drains to the north and south around Blue Diamond Hill into the Las Vegas Valley. The Calico Hills appear to be a jumbled mass of rust-colored sandstone boulders at the north end of the valley. Brownstone Canyon and Little Red Rocks are two smaller canyons draining easterly into the Las Vegas Valley. Many outcroppings of cream and rust-colored sandstone occur within each of the two canyons.

The "Slope Limitations" Map was generated using Defense Mapping Agency (DMA) elevation base data and the U. S. Department of Agriculture's VIEWIT computer program (See Appendix B). This map portrays areas where the slope is 25% or greater. This figure of 25%, the maximum slope on which drilling operations can occur without encountering major enginering problems and severe environmental consequences, was derived from personal communications with the Wyoming BLM State Office Surface Protection Specialist (Richard Hopkins, December 1979). He developed this figure based on: 50 years of oil and gas field operations in Wyoming; meetings with oil and gas operators; consultations with the USGS's Conservation Division-Central Region, and the Office of the Wyoming State Oil and Gas Supervisor, along with guidance from the Occupational Safety & Health Administration's recommended operating procedures.

SOILS

The soils of the RRCRL were mapped by the U.S. Soil Conservation Service in 1975. An adaptation of this mapping is presented on The "Soil Associations" Map. The soils were classified to the family level and then grouped into associations, groups of soils which occur in a predictable pattern on the landscape. Research indicates that most soils in this area were formed under cold, wet climatic conditions and will not form under the existing hot, dry climatic conditions (Nettleton et al, 1975) (Shlemon, 1979).

Descriptions of the soil associations located in the RRCRL are in Appendix C. Some physical properties of the soils in the RRCRL are described in Table 3-2.



AREAS WITH SLOPES THAT EXCEED 25%

Source: Robert Taylor 1-28-80

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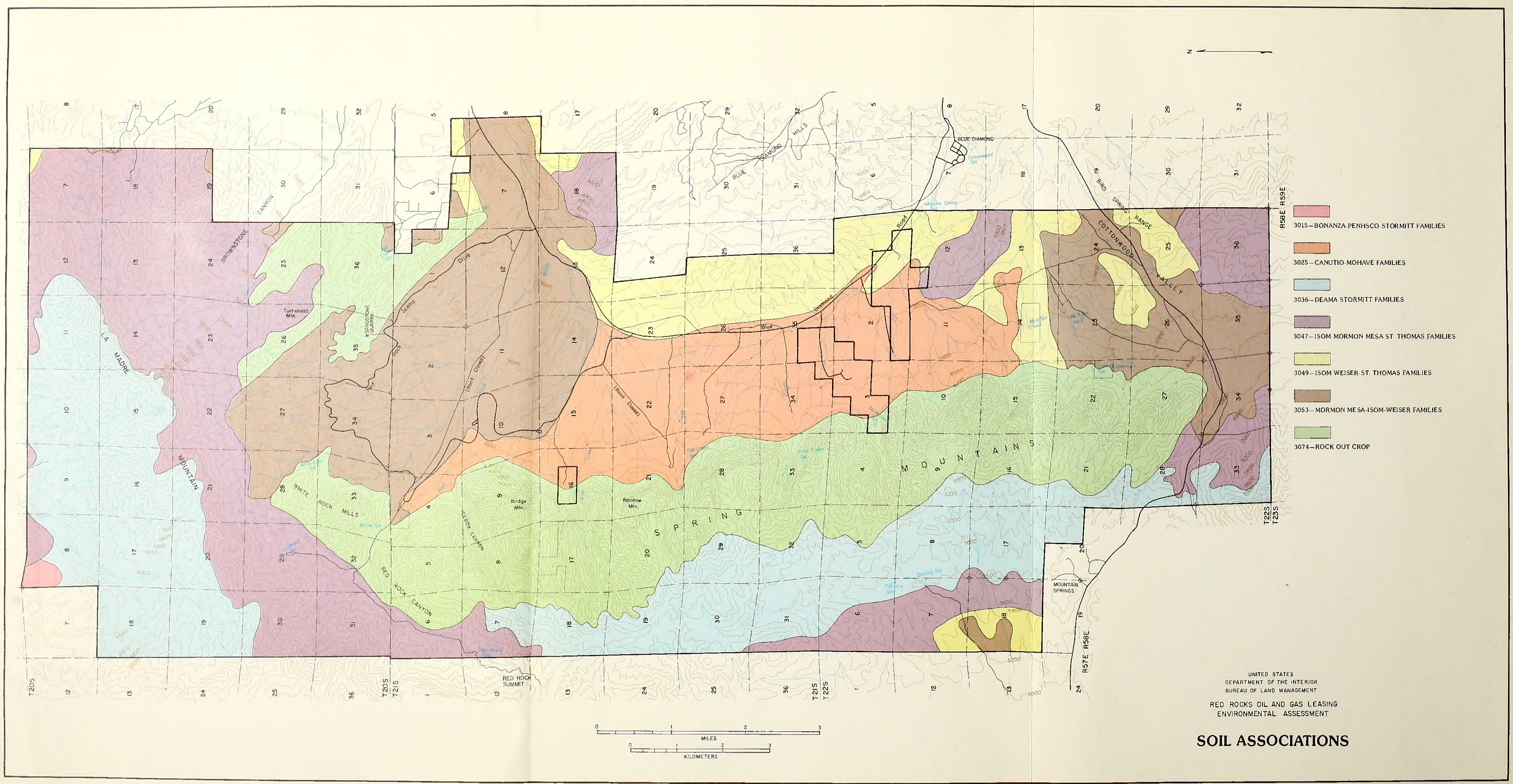
SLOPE LIMITATIONS


3015–BONANZA-PENHSCO-STORMITT FAMILIES
3025–CANUTIO-MOHAVE FAMILIES
3036–DEAMA STORMITT FAMILIES
3047–ISOM-MORMON MESA-ST. THOMAS FAMILIES
3049–ISOM-WEISER-ST. THOMAS FAMILIES
3053–MORMON MESA-ISOM-WEISER FAMILIES
3074–ROCK OUT CROP
LA MADRE MOUNTAIN
BROWNSTONE CANYON
BLUE DIAMOND HILLS
BLUE DIAMOND
BIRD SPRING RANGE
COTTONWOOD VALLEY
SPRING MOUNTAINS
WHITE ROCK HILLS
RED ROCK CANYON
ICEBOX CANYON
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
MOUNTAIN SPRINGS
RED ROCK SUMMIT
SANDSTONE QUARRY
Scenic Drive
Blue Diamond Road
T20S
T21S
T22S
T23S
R57E
R58E
R59E
MILES
KILOMETERS
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SOIL ASSOCIATIONS

TABLE 3-2

PHYSICAL PROPERTIES OF THE MAJOR SOIL FAMILIES IN THE RRCRL

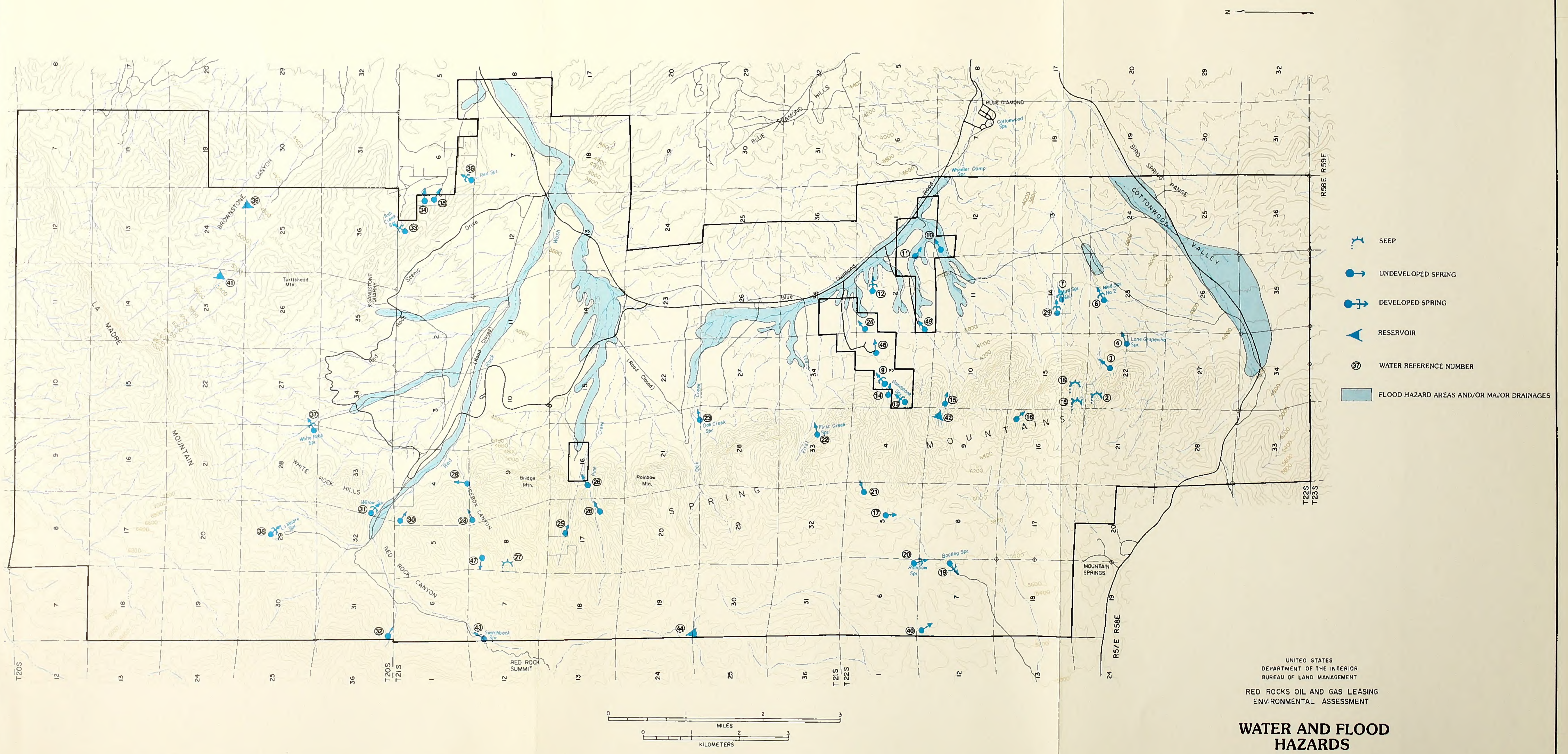
SOIL FAMILY NAME	DEPTH TO HARAPAN OR ROCK	COLOR CONTRAST OF SURFACE TO SUBSURFACE	CORROSIVITY UNTREATED STEEL	CORROSIVITY UNTREATED CONCRETE	HAZARD OF COMPACTION	*EROSION HAZARD WATER	*EROSION HAZARD WIND	LOSS OF PRODUCTIVITY SHOULD SURFACE BE TRUNCATED	PERMEABILITY	COMMENTS
CANUTIO	60"	low	low	low	low	slight	slight	moderate	high	A recent depositional soil
DEAMA	rock 20"	moderate	low	low	low	moderate	slight	severe	medium	Has an horizon with an accumulation of free lime
ISOM	60"	low	high	low	low	moderate	slight	moderate	high	A recentdepositional soil
MOHAVE	rock 40"-60"	moderate	moderate	low	moderate	slight	moderate	moderate	medium	Has an horizon with an accumulation of clay
MORMAN MESA	hard pan 20"	high	high	low	low	moderate	moderate	moderate	medium	
ST THOMAS	rock 20"	low	moderate	low	low	moderate	slight	moderate	medium	

Table 3-2, Properities of Soil Families (cont)

STORMITT	rock 40"-60"	moderate	low	low	low	moderate	slight	moderate	medium	**Has an accumula- tion of organic matter in the surface
WEISER	60"	high	high	low	low	slight	slight	moderate	high	Has an ho- rizon with an accu- mulation of free lime
BONANZA	60"	moderate	high	low	low	moderate	slight	moderate	medium	Has an accumula- tion of organic matter in the sufrace
PENASCO	pan 20"	high	high	low	low	slight	slight	moderate	medium	

*Where gradients exceed 10% hazard to water erosion is greatly increased

**Also has an horizon with an accumulation of free lime



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WATER AND FLOOD HAZARDS

WATER

Surface Water

Surface water occurance within the RRCRL is limited to ephemeral streams and short brooks associated with springs. Some natural catchments and man-made reservoirs provide additional surface water sources.

Red Rock Wash and Cottonwood Wash are the more significant drainages in the area. These, and others, have been classified, in part, as Flood Hazard Areas by the U.S. Department of Housing and Urban Development. Flood Hazard Areas are zones subject to the 100 year flood. The "Water and Flood Hazard Map illustrates these zones within the Red Rocks area.

Ground Water

The RRCRL are within the Las Vegas Valley hydrographic region, draining primarily in the direction of the Colorado River. Ground waters in RRCRL are recharged by the infiltration of precipitation into permeable carbonate and sandstone rock layers along the Keystone Thrust. It also occurs through the infiltration of streamflows into the soil in alluvial channels.

Westphal et al (1975) noted that such recharge usually reaches lower elevations by moving down fractures and along planes within rock layers where a difference in permeability slows the water's downward movement.

Occasionally, recharging water will reach the contact surface between two different layers, with the lower layer being much less permeable than the upper. This causes the water to move along the contact surface, eventually appearing as a spring. Springs in RRCRL are of this "contact" type where the water emerges betweeen two clearly defined rock layers. In RRCRL this occurs at the contact of the Aztec sandstones and the less permeable upper Chinle shale. Some "contact" springs in RRCRL also occur when such contact surfaces are hidden from view by alluvial fans. In this case the ground water discharges into the alluvium saturating the material to the land surface.

Westphal also concluded that stream flow may infiltrate into the soil on the valley floor and re-emerge downstream, giving the impression of more water being available than actually exists. Smith et al, (1969) estimatedthat about 500 gallons per minute (gpm) discharged from the springs and is already appropriated. Wells in the area are generally privately owned.

The "Water and Flood Hazard" Map illustrates the occurrence of springs, catchments, and reservoirs in and around the RRCRL. Table 3-3 provides the names of those waters and flow rates where applicable.

A record of wells indicating location, ownership, depth to water, aquifer material and other information is presented in Table 3-4.

Water Quality

The chemical quality of springs in the RRCRL is good. They are classified as carbonate waters, with most being the calcium and magnesium carbonate types (Westphal, et al, 1975). However, a recent water quality survey by the BLM showed bacterial contamination of many springs in the RRCRL. Fecal coliform, indicating contamination by warm blooded animals, were present in 10 of 11 springs sampled. Full chemical analysis are available by examination of Westphal, et al, (1975) or the BLM Water Quality Analysis Report (1979).

TABLE 3-3

WATERS IN THE RRCRL

MAP No.	SPRING/RESERVOIR NAME	FLOW (GPM)	DATE[a] MEASURED	LOCATION[b]
1[c]	Mountain Springs	2.6	7/79	22/58-20b
2	Unnamed Seep	0.1	8/79	22/58-22b
3	Moonshine Spring	2.0	7/79	22/58-22a
4	Lone Grapvine Spring	Dry	7/79	22/58-22d
5 c	Bighorn Spring	0.1	7/79	22/58-29a
6	Mud Spring #2	0.2	7/79	22/58-23b
7	Mud Spring #1	1.5	7/79	22/58-14c
8 c	Wheeler Camp Spring	24.0	6/79	22/59-7b
9	Heart Spring	0.1	9/79	22/58-3b
10	Mormon Green Spring	6.0	6/79	22/58-12b
11	Mormon Green Spring	6.0	6/79	22/58-1c
12	Lone Willow Spring	Dry	8/79	22/58-2a
13	Sandstone Spring #1	189.7	8/74	22/58-3c
14	Sandstone Srping #2	129.1	8/74	22/58-3b
15	Point Spring #2	0.1	9/79	22/58-10b

[a]BLM Water Surveys, except where noted.

[b]Number is the State of Nevada assigned number representing township/range-section and section subdivisions (a, northeast; b, northwest; c, southwest; d, southeast)

[c]Outside of RRCRL

Table 3-3 (continued)

16	Unnamed Seep	0.1	6/79	22/58-16a
17	Upper Sandstone Spring	0.1	6/79	22/58-5d
18	Red Rocks Seeps	2.0	9/79	22/58-15c
19	Bootlet Spring	0.5	7/79	22/58-7a
20	Rainbow Spring	Dry	7/79	22/58-6d
21	Sandstone Seep	0.1	9/79	22/58-5a
22	First Creek Spring	10.0	7/79	21/58-33a
23	Oak Creek Spring	15.0	7/79	21/58-21d
24	Greenspot Spring	3.3	7/75	22/58-2b
25	Unnamed Seep	0.1	7/79	21/58-17a
26	Pine Creek Spring	25.0	7/79	21/58-16c, 17d
27	Unnamed Seep	unk	7/79	21/58-8b
28	Icebox Canyon	0.1	7/79	21/58-9b
29	Unnamed Seep	--	--	22/58-14c
30	Lost Creek Spring	15.0	6/79	21/58-4b
31	Willow Spring	0.5	6/79	21/58-33c
32	South Fork Spring	17	7/79	20/58-31c
33	Ash Creek Spring	0.1	8/79	21/58-1a
34	Little Creek Spring	0.1	8/79	21/58-1a
35	Calico Spring	0.2	8/79	21/58-1c
36	Red Spring	8.0	8/79	21/59-7b
37	White Rock Spring	1.0	6/79	20/58-33a
38	La Madre Spring	10	7/79	20/58-29a

Table 3-3 (continued)

39	White Rock Dam	n/a	9/79	20/58-25a
40	Lone Pine Spring	1.5	8/79	21/58-7b
41	Brownstone Res.	n/a	9/79	20/58-23d
42	Unnamed Catchment	n/a	8/79	22/58-9a
43	Switchback Spring	3.0	8/79	21/58-7b
44	Unnamed Catchment	n/a	9/79	21/58-30b
45	Unnamed Seep	0.5	9/79	21/57-1a
46	Unnamed Seep	0.1	9/79	21/57-1d
47	Unnamed Spring	3.5	9/79	21/58-8b
48	Fig Spring	0.1	1975[d]	22/58-3b
49	Bonnie Springs. (1-3)	76	12/65[e]	22/58-2c

[d]Westphal, et al, 1975

[e]Smith, et al, 1969

TABLE 3-4

RECORD OF WELLS IN RRCRL

LOCATION a	OWNER OR NAME	DEPTH (FEET)	AQUIFER b (MATERIAL AND DEPTH IN FEET)	DEPTH TO WATER (FEET BELOW LAND SURFACE DATUM)	REMARKS
20/58-33cc	BLM, Willow Spring Well	200	Sandstone, 180-185	88	Bailed 27 gpm
-28dd	BLM, White Rock View Site	250	Sandstone, 78-78 1/2	225	Top of consolidated rocks 7 feet. Insufficient yield
21/59-6bab	Frank Ford	125	Lime, 94-108	66	Domestic well
-6bab	Richard Gardner	100	Clay, 54-86	54	Domestic well
-6bd	George Heyer	632	Shale, 62-72	23	Domestic well
-6bda	Betty Yenko	158	Sandstone, 149-153	54	Domestic well
-6bda	R. A. Grigg	62	—	35	Domestic well
-6ac	Martin Hanson	160	Lime, 48-56	63.5	Top of consolidated rock, 48 feet
-6dbc	Paul Hayward	96	Limestone, 64-75	52	
-6dbc	Cecil Pierce	80	Gravel, 60-65	40	No consolidated rock encounter in drilling
21/58-13ac	BLM, Blue Diamond Hill Site	89	—	dry	Top of consolidated rock (limestone), 63 feet
22/58-2bc	Job Corps, No. 2	100	Red clay, 65-69	47	Located about 0.35 mi. W. of No. 1 Insufficient water

TABLE 3-4 (CONTINUED)

LOCATION a	OWNER OR NAME	DEPTH (FEET)	AQUIFER b (MATERIAL AND DEPTH IN FEET)	DEPTH TO WATER (FEET BELOW LAND-SURFACE DATUM)	REMARKS
22/58-2ab	Job Corps, No. 1	135	Alluvium 45-50	31	Insufficient water. No consolidated rock encountered
22/59-8bd	Blue Diamond	75	25-54	6	Used at plant and village
-8bd	Blue Diamond	58		—	Used at plant and village
-15ca	Wilford Gagnon	400	Shale, 360-365, 340-345	—	
20/60-30cd	Las Vegas Water District	1,003	—	—	
-33dd	Las Vegas Water District	1,000	Gravel, 465-970	457	Pumps 3,000 gpm, drawdown 84 feet
21/60-16bd	Clear Gravel, Inc.	750	Cemented gravel, 405-750	405	Pumps 350 gpm from 500 feet
-15bd	Wells Cargo	600	Alluvium, 265-600	265	Pumps 400 gpm from 400 feet
-22bb	Stardust Racing	600	Cemented gravel, 295-600	295	
-21da	WMK Transit Mix	750	Alluvium, 630-633	290	Pumps 700 gpm drawdown 345 feet
-21dd	Stock Mill and Supply	880	Gravel, 330-335	310	Well for gravel pit
22/58-20cb	Paul Warner	125	Alluvium, 24-125	—	
-20cd	James Greene	—	Limestone, 135-160	—	

TABLE 3-4 (CONTINUED)

LOCATION[a]	OWNER OR NAME	DEPTH (FEET)	AQUIFER[b] (MATERIAL AND DEPTH IN FEET)	DEPTH TO WATER (FEET BELOW LAND-SURFACE DATUM)	REMARKS
22/58-1cd	INFORMATION UNAVAILABLE				
21/59-6	George Heyer	498		—	
-6	George Heyer	337	Gravel, 99-103	103	Well deepened from 173 foot depth
22/58-19	Tom Collins, Mountain Springs	167	Sand and gravel, 132-142	—	

(Source: Smith, R. E., Rush, F. E., and R. F. Hadley, 1969, proposed Water Supply Development in the Red Rock Canyon Recreation Lands near Las Vegas, Nevada.

[a]Number is Nevada well number; township, rangesection, and section, and section subdivisions (a, northeast; b, northwest; c, southwest; d, southeast).

[b]From driller's log

GEOLOGY

Geologic History & Stratigraphy

For the greater part of its detectable geologic history, the RRCRL was an ancient deep sea bed which rose eastward to a shoreline somewhere in present-day Western Utah. Rock exposures and fossils, which can be seen in the area today, attest to a marine environment which lasted for nearly 400 million years. During this vast expanse of geologic time, thick deposits of carbonate sediments accumulated along with lesser amounts of shale and sandstone. These gray limestones, being highly resistant to erosion, now form the highlands of the Spring Mountains and can be seen, in some instances, as prominent peaks such as the La Madre and Turtlehead mountains. Figure 3-1 illustrates the order in which these sediments accumulated as well as their relative geologic time position, formational name, thickness, and general rock composition.

In general, the Paleozoic Era can be characterized by long periods of submergence, relatively stable crustal conditions, and warm seas which allowed chemical preciptiation of carbonates. Towards the end of the Paleozoic Era, this ancient sea became progressively more shallow as evidenced by rather drastic changes in sedimentation.

The marine limestones and shales were overlain by evaporite deposits (chemically precipitated limestone and gypsum), fine muds, silt, and sand which washed in from emerging land areas. Thus, the Permian Red Beds, Toroweap, and Kaibab Formations represent a near shore environment, arid climate, and restricted sea water circulation. These climatic and physiographic conditions continued into the Triassic, resulting in the deposition of the Moenkopi Formation. The limestone, found in the middle of this formation, is thought to represent the last invasion of the Triassic Sea.

Stratigraphically above the Moenkopi is the Chinle Formation. Sediments and fossils within this unit testify to continental (terrestial) deposition. The Chinle consists primarily of variegated shales and thin lenticular sandstones. A coarse congolmerate generally separates the Chinle from the underlying Moenkopi. Petrified wood is fairly common in this formation. Although plants and animals (reptiles) were abundant during Chinle deposition, few of their remains were preserved because the environment allowed decomposition to occur before fossilization began. Permian and Triassic clastic sediments are easily identified in the RRCRL area, when exposed, by their characteristic red color. The red coloration is derived from the oxidation of iron compounds contained within the sediments shortly after deposition.

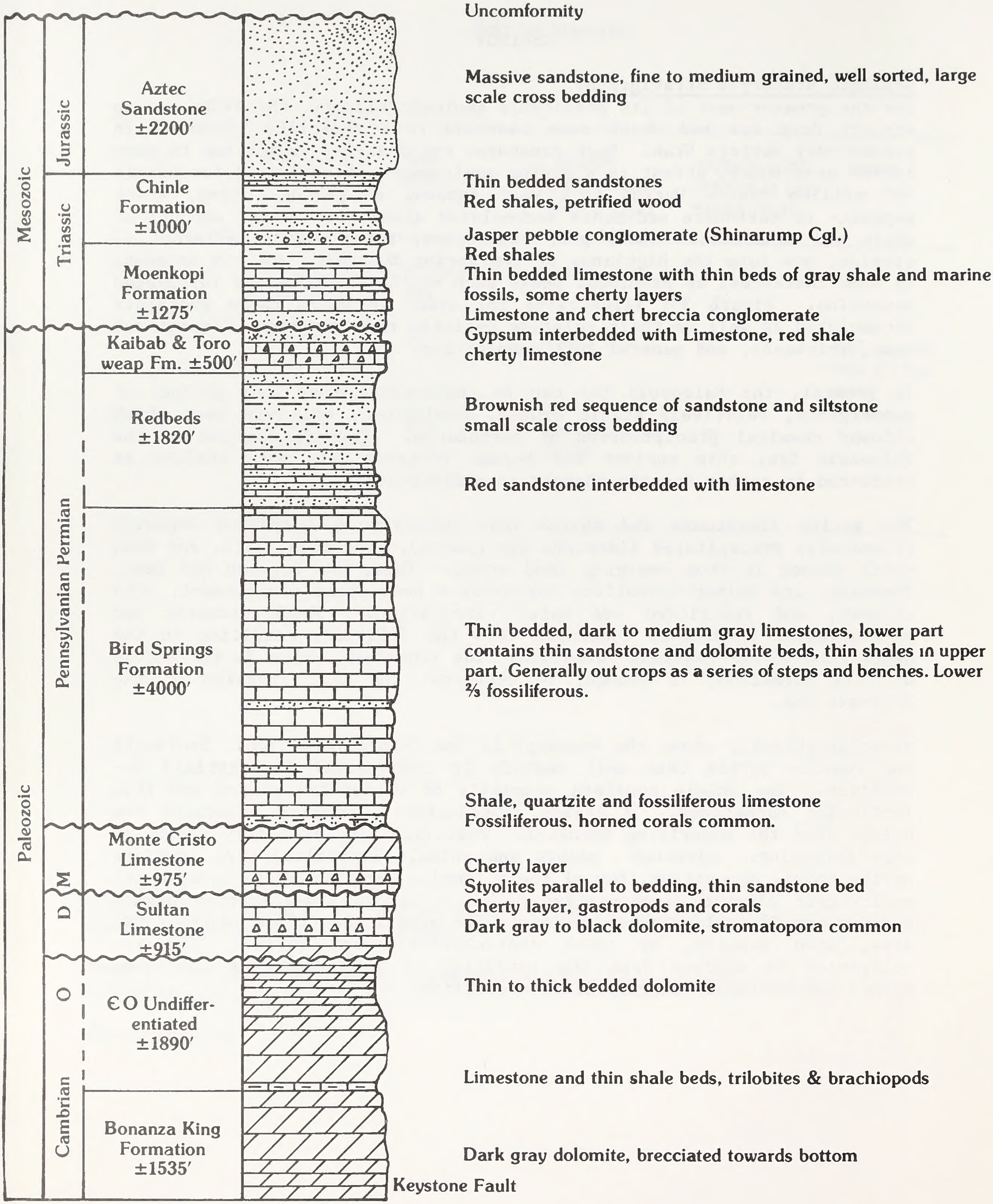


Figure 3-1. Stratigraphic Units of the RRCRL

O=Ordovician D=Devonian M=Mississippian

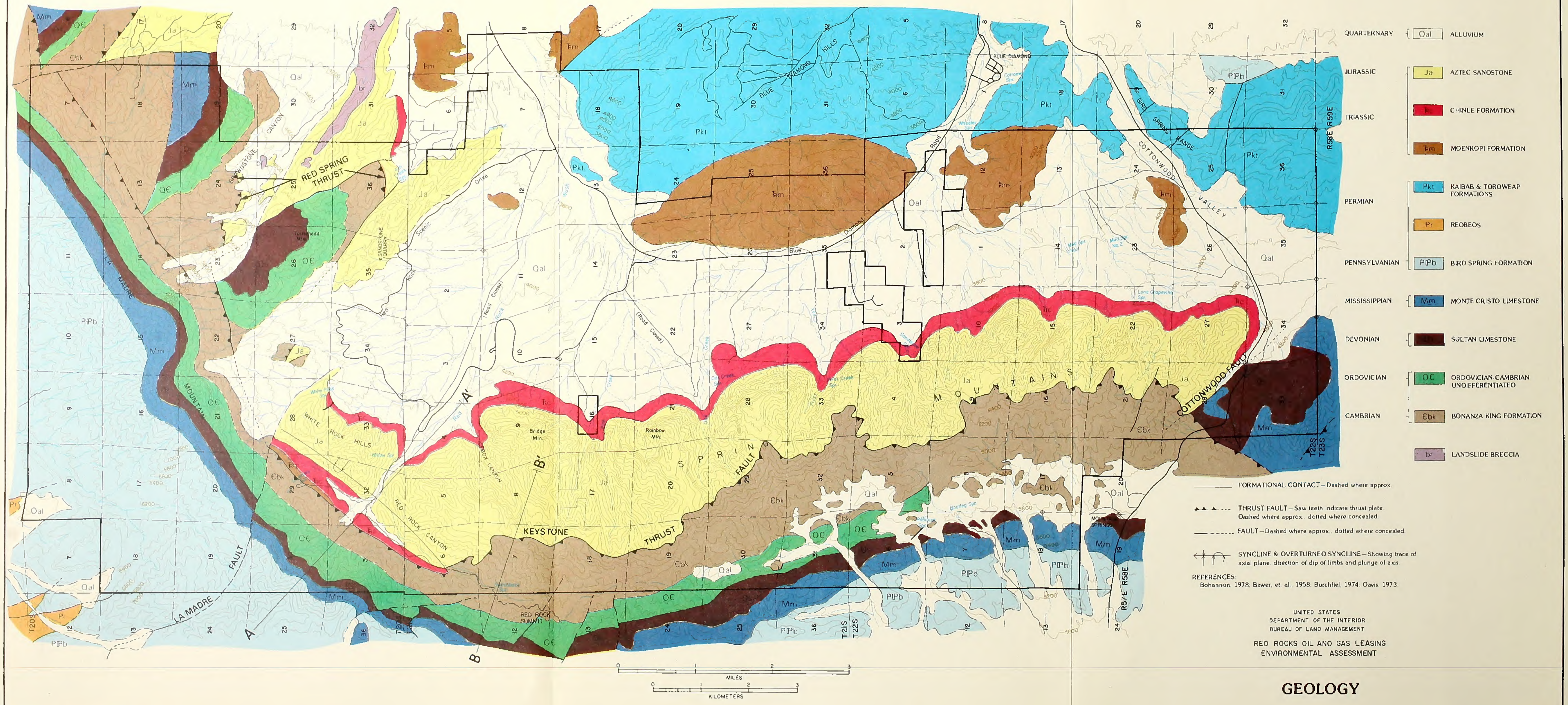
The youngest, and most distinctive, formation is the Aztec Sandstone of Jurassic Age. Perhaps providing the most scenic aspect of the area, the Aztec is easily identifable because of alternating hues of red, yellow and white, and the conspicuous cliff it forms along the east flank of the Spring Mountains. The Aztec is thought to have originated from wind-blown deposits and represents "fossil" sand dunes. Typically, this formation is massive (without stratification, bedding planes, joints etc); is uniform in composition; exhibits large scale crossbedding, and weathers into abstract forms. As with the Chinle Formation, fossils are scarce to non-existant because the environment allowed decomposition to occur before fossilization began. Fiero (1976) believes the color variations displayed by the Aztec result from ground water percolating through the sand and leaching out the oxidized iron. Distinct color changes are probably caused by abrupt changes in porosity and permeability. The "Geology" Map provides an overhead view of the distribution of the stratigraphic units.

Structure

The dominant structural feature in the RRCRL area, and the easiest to identify in the field, is the Keystone Thrust Fault. Thrust faults are a type of crustal fracture characterized by a low angle of inclination (less than 45°) with reference to a horizontal plane. They generally emplace older rocks on top of younger rocks, which is the case with the Keystone Thrust.

Secor (1962) believes that during late Mesozoic or early Tertiary, large scale crustal movements to the west sheared off basement rock and pushed it many miles eastward. Thus, Paleozoic limestones and dolomites were thrust over an erosional surface developed on the Mesozoic Aztec Sandstone. The west-dipping thrust contact is clearly defined and visable by the sharp contrast between the dark gray dolomites of the Cambrian Bonanza King Formation and the yellow/red sands of the Jurassic Aztec. Two cross sectional views of the fault are provided by Figure 3-2 to illustrate stratigraphic and structural relationships.

These highly resistant limestones and dolomites of the thrust plate protected the softer sandstones of the Aztec from erosion where they covered them, thus forming the present day escarpment. This east-facing escarpment, over 3,000 feet high, extends from its southern boundary, the Cottonwood Fault, 13 miles northward where it is interrupted by the La Madre Fault as shown on the Geology Map.



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GEOLOGY

Qal	**Alluvium**
Ja	**Aztec Sandstone**
Ŧc	**Chinle Formation**
Ŧm	**Moenkopi Formation**
Pkt	**Kaibab & Toroweap Formations**
Pr	**Redbeds**
PIPb	**Bird Spring Formation**
Mm	**Monte Cristo Limestone**
Ds	**Sultan Limestone**
O€	**Ordovicion-Cambrian Undifferentiated**
€bk	**Bonanza King Formation**
€	**Cambrian Undifferentiated**
p€	**Precambrian**

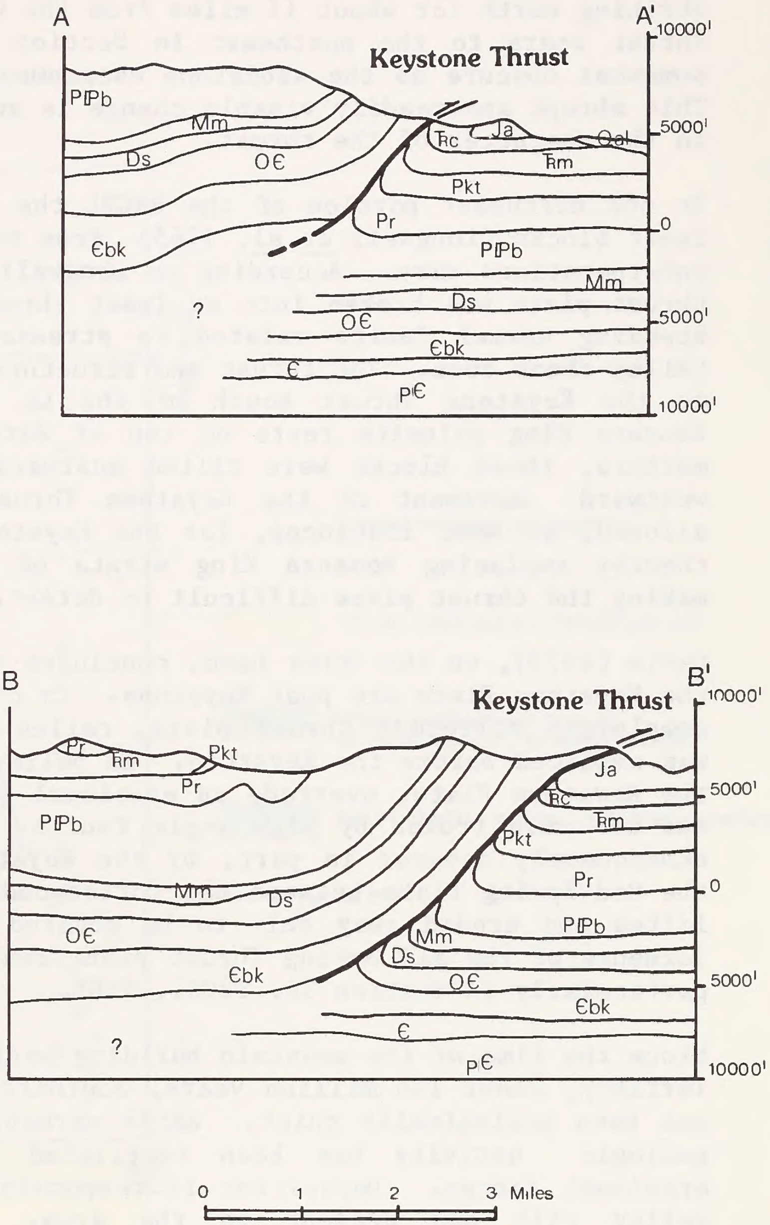


Figure 3-2. Geological cross sections of RRCRL (modified from Burchfiel, *et al*, 1974)

Striking north for about 11 miles from the Cottonwood Fault, the Keystone Thrust rears to the northeast in Section 6 T21S., R58E., and becomes somewhat obscure as the sandstone escarpment ends at the La Madre Fault. This abrupt and readily visable change is accompanied by a radical change in the character of the thrust.

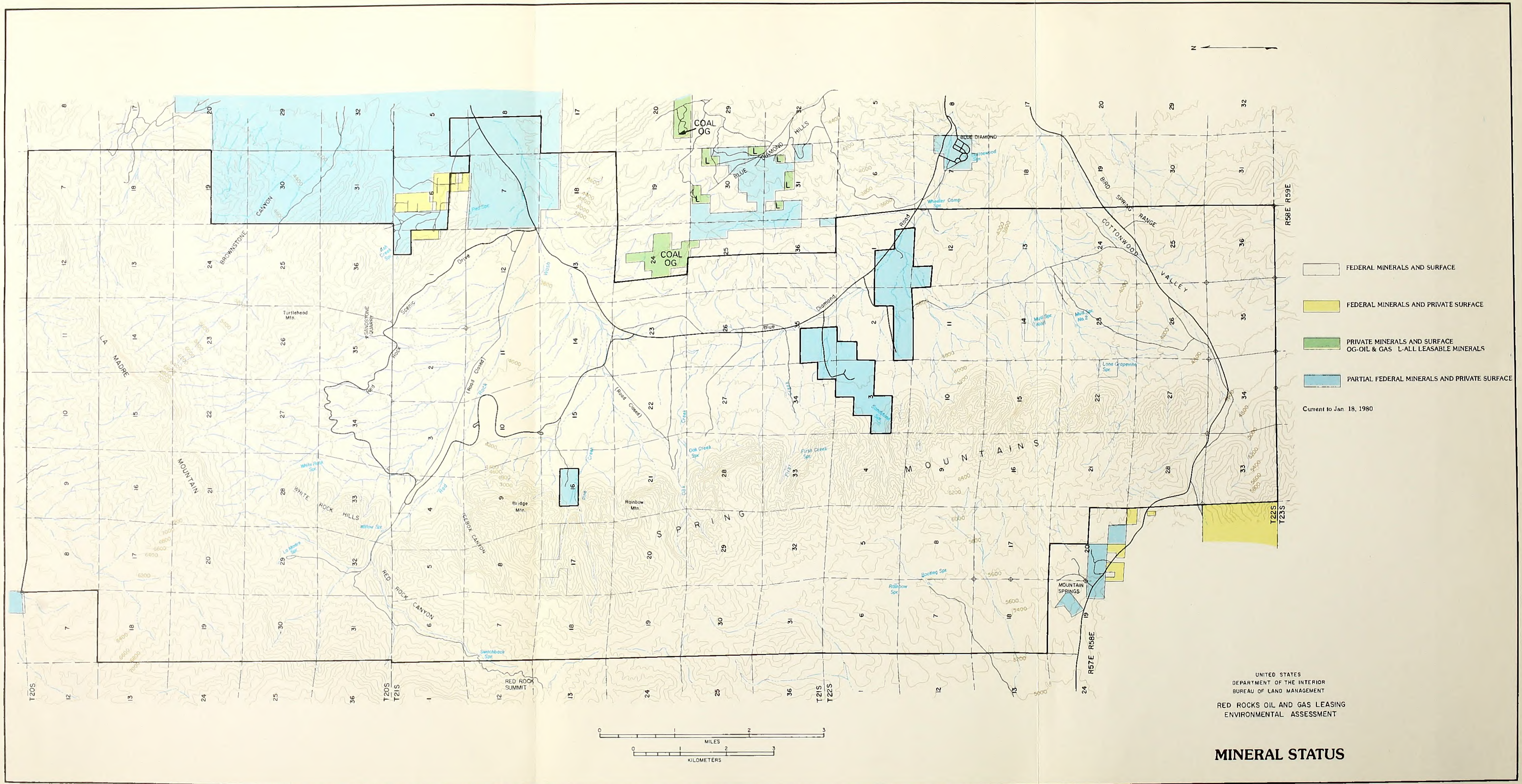
In the northeast portion of the RRCRL the thrust plate rests on rotated fault blocks (Longwell et al, 1965) From this point, however, structural interpetations vary. According to Longwell (1960) the front part of the thrust plate was broken into at least three major blocks by north-south trending normal faults related to stresses produced by the Las Vegas Valley shear zone. The thrust and structure in these blocks is identical to the Keystone Thrust south of the La Madre fault; in each block Bonanza King dolomite rests on top of Aztec sandstone. To complicate matters, these blocks were tilted eastward and overridden by continued westward movement of the Keystone Thrust Plate (Secor, 1962). This allowed, in some instances, for the Keystone plate to override itself, thereby emplacing Bonanza King strata on top of Bonanza King strata, making the thrust plane difficult to detect.

Davis (1973), on the other hand, concludes that thrust faults lying below the Keystone Plate are post Keystone. In other words, they are part of a completely different thrust plate, called the Red Spring Thrust, which was emplaced before the Keystone. He believes the Red Spring Plate, like the Keystone Plate, overrode an erosional surface on the Aztec Sandstone and was then broken by high angle faults. The down-thrown blocks were subsequently covered in part, by the Keystone Thrust. That portion of the Red Spring Plate between the Cottonwood and La Madre Faults, was uplifted and eroded away only to be covered again by the Keystone Plate. Segments of the Red Spring Thrust plane can be easily seen in the RRCRL, particularly in Section 36, T20S., R58E.

Since the time of the mountain building period from late Mesozic to early Tertiary, about 135 million years, Southern Nevada, including the RRCRL, has been geologically quiet. Aside perhaps from infrequent rock falls, geologic activity has been restricted largely to depositional and erosional forces. Deposition is responsible for the alluvial fans and valley fill now present in the area. Erosion has created many interesting rock features such as natural arches, rock chimmeys and potholes.

Mineralization

The RRCRL contains no known mineralization except for building stone, sand, gravel, and petrified wood. Mining claims, located prior to the


N
FEDERAL MINERALS AND SURFACE
FEDERAL MINERALS AND PRIVATE SURFACE
PRIVATE MINERALS AND SURFACE
OG-OIL & GAS L-ALL LEASABLE MINERALS
PARTIAL FEDERAL MINERALS AND PRIVATE SURFACE
Current to Jan 18, 1980
COAL OG
BLUE DIAMOND HILLS
BLUE DIAMOND
BIRD SPRING RANGE
COTTONWOOD VALLEY
BROWNSTONE CANYON
LA MADRE MOUNTAIN
WHITE ROCK HILLS
SPRING MOUNTAINS
RED ROCK CANYON
ICEBOX CANYON
MOUNTAIN SPRINGS
RED ROCK SUMMIT
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
SANDSTONE QUARRY
Scenic Drive
Blue Diamond Road
R58E R59E
R57E R58E
T20S T21S
T21S T22S
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1967 withdrawal of the area from mining location, were staked primarily for building stone. Uranium was also claimed, but to a lesser degree. The area was not withdrawn from operation of the mineral material and leasable mining laws primarily because these actions are discretionary to the BLM whereas actions taken by persons under the 1872 Mining Law are statuatory rights granted by Congress.

Just outside the east boundary of RRCRL on Blue Diamond Hill, is the Blue Diamond Gypsum mine and mill. The mine has been in operation since 1910 and currently produces in excess of 300,000 tons of gypsum per year.

Nearly all land in the RRCRL, except for some 2,200 acres is subject to the Mineral Leasing Act of 1920 as amended and can be leased for oil and gas or any other leasable mineral. That is shown on the "Mineral Status" Map. The USGS has designated lands within and around the RRCRL as being potentially valuable for oil and gas but not for any other leasable minerals, including geothermal resources. As with any wildcat area these lands are not within a known geologic structure (KGS).

No oil and gas leases have yet been granted in the RRCRL. However, 30 lease applications, covering the entire Red Rock area, are pending. The "Oil and Gas Applications and Leases" Map, (Chapter 1) shows these lease applications in addition to leases and applications within one mile of the Red Rock boundary.

The private sector, like the U.S. Geological Survey, feels all of Southern Nevada, including RRCRL, may be potentially valuable for oil and gas, due to its location in a geologic province known as the Over thrust Belt. This province, considered by the petroleum industry as one of the most promising onshore exploratory regions in the United States, is thought to extend from Alaska to Guatamala (Figure 3-3). Opinions differ as to its west-east boundaries as Figures 3-4 and 3-5 illustrate. The Cordillera Hingeline shown on Figure 3-5 does not portray the western limits of the thrust belt, but is a depositional feature related to broad uplifts. Figure 3-6 is an overview of the belt showing in detail some of the recent oil and gas field discoveries on the belt in the United States.

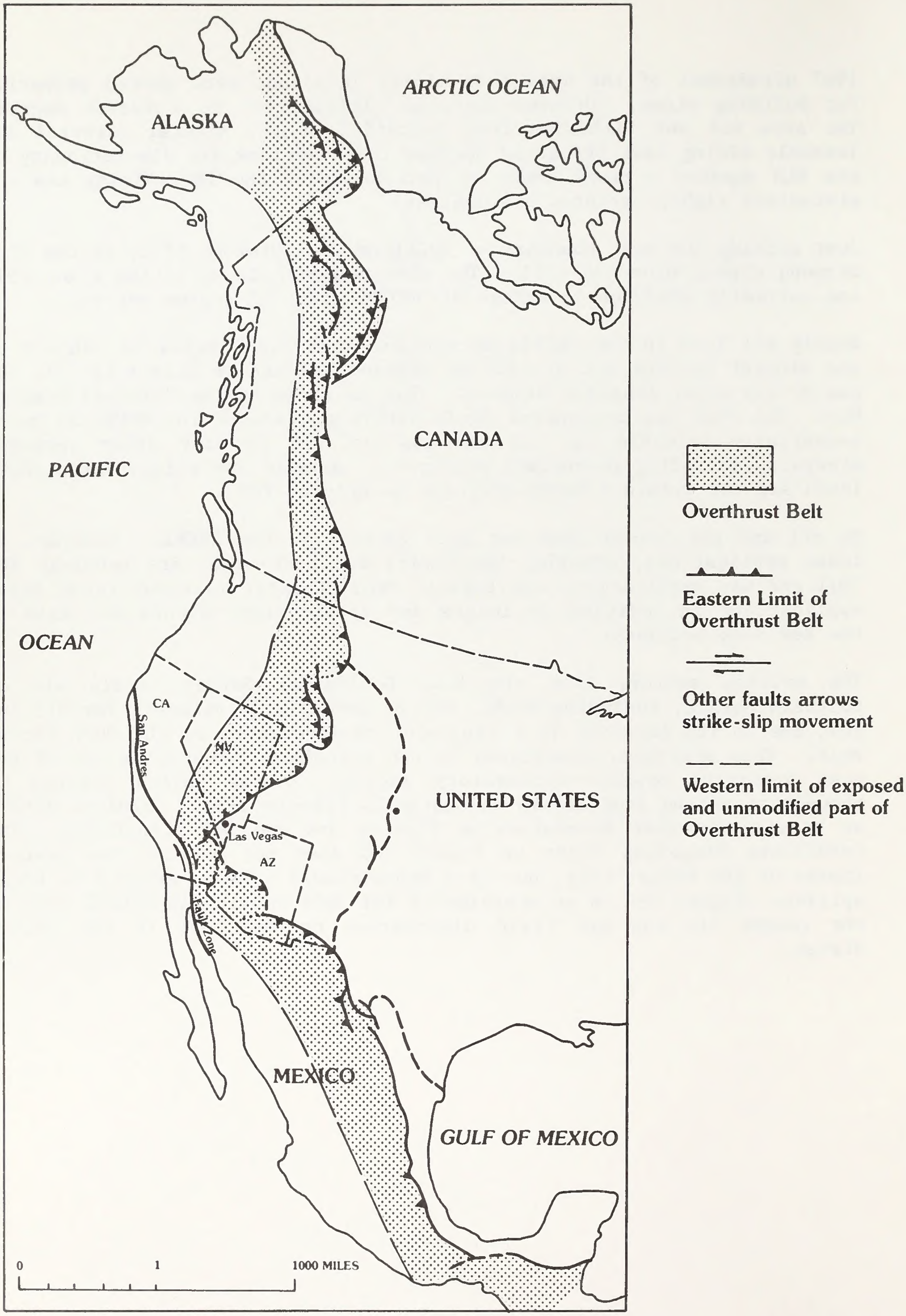


Figure 3-3. Map of North America showing the Overthrust Belt (modified from an interpretation by Drewes, 1978).

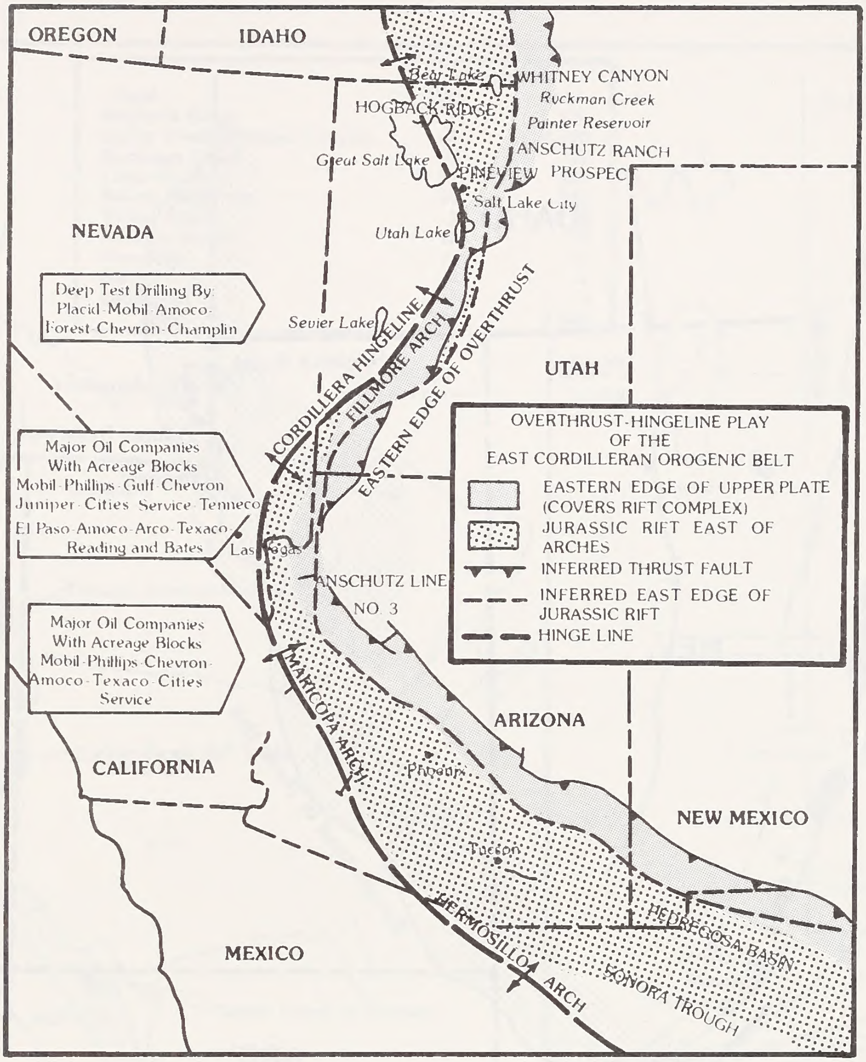


FIGURE 3-4. Interpretation of where the Overthrust Belt and Cordillera Hingeline occur in Arizona and Nevada from the Anschutz Corp. (*Oil and Gas Journal*, July, 1979)

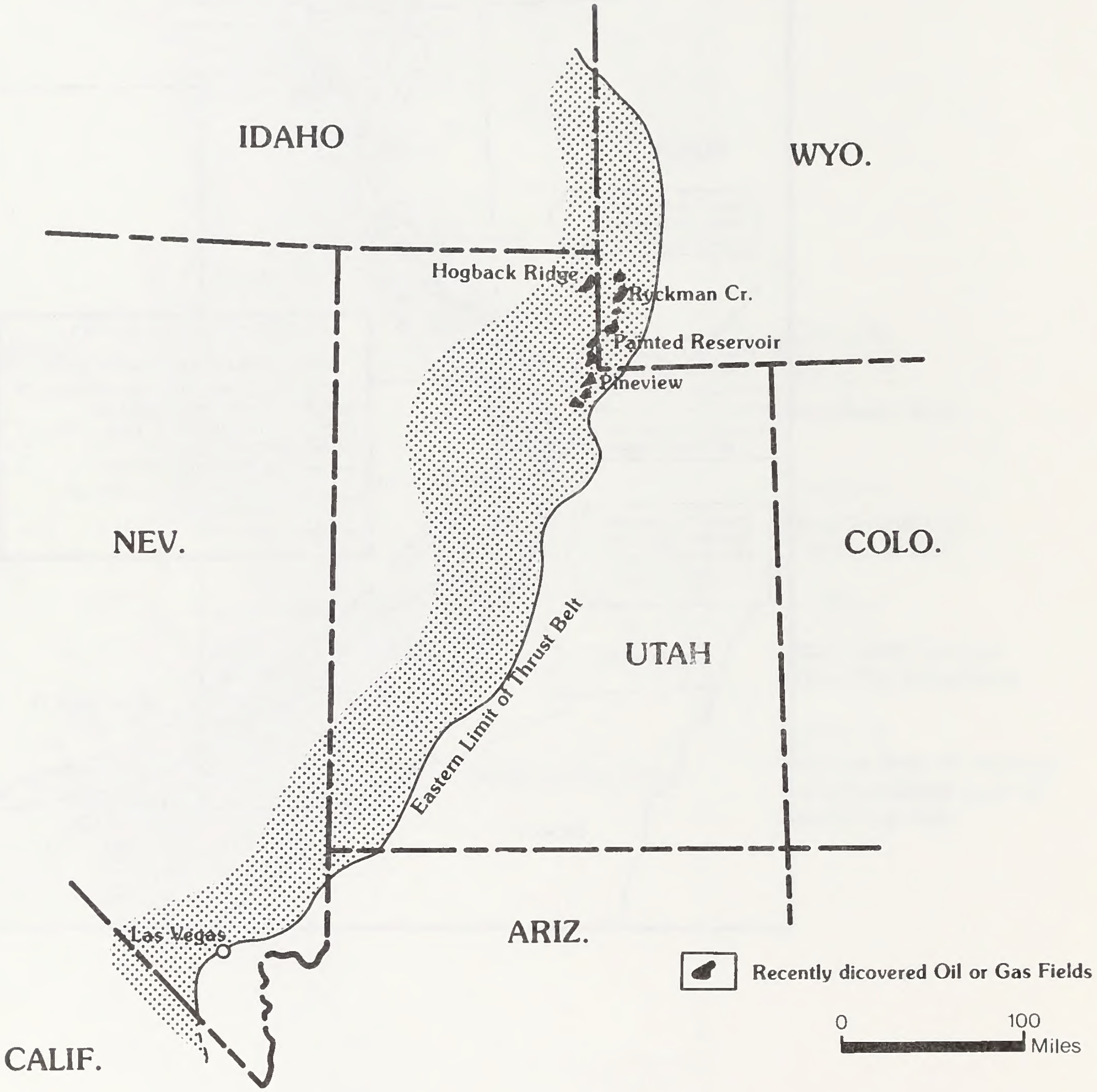


Figure 3-5. Interpretation by Chevron, Inc. (1979) of where the Overthrust Belt occurs in Nevada and Utah. Western Limit is not defined.

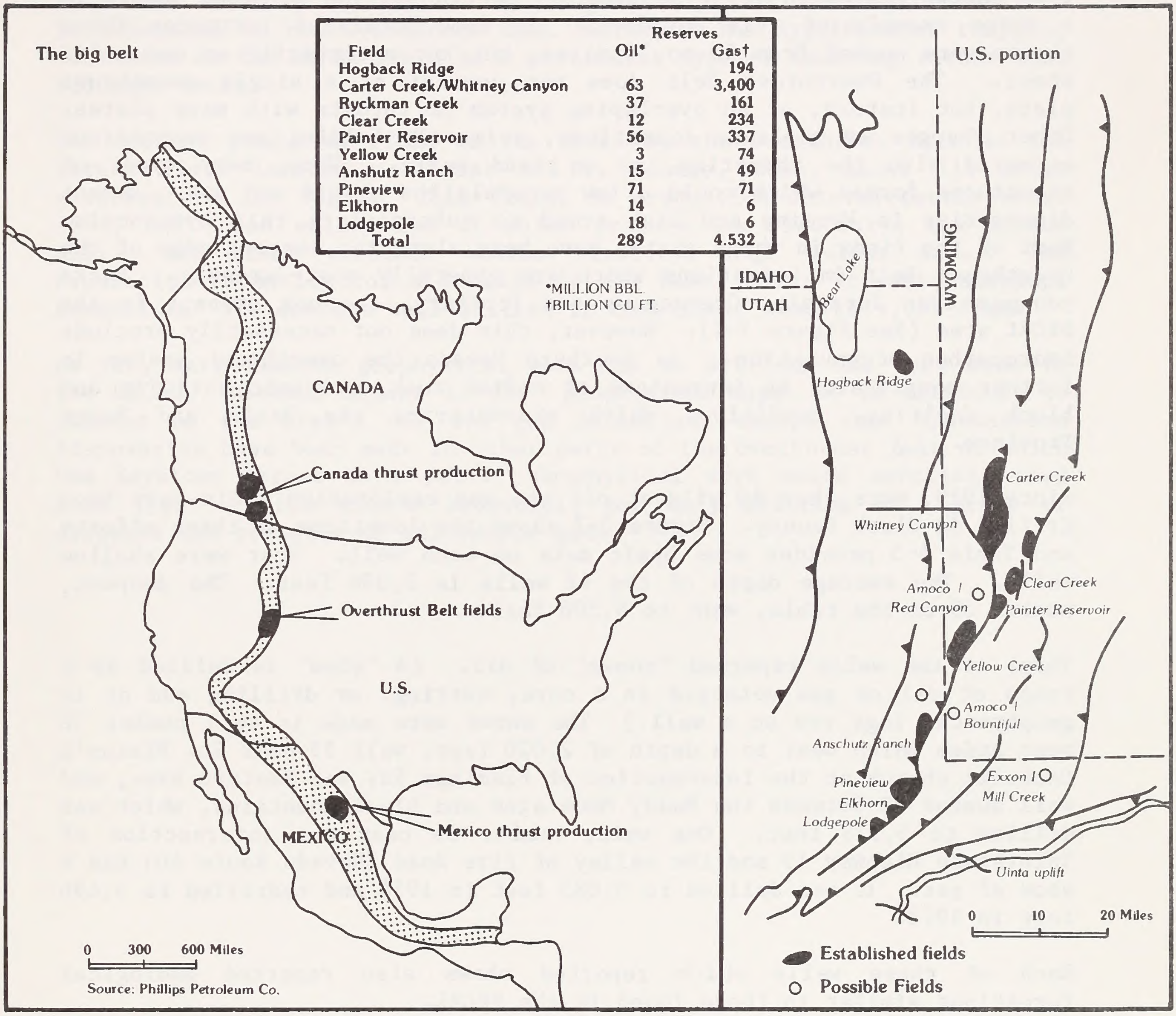


Figure 3-6. General overview of the Overthrust Belt with detail showing recent discoveries of oil and gas fields and table showing quantities of reserves in those fields. (*Oil and Gas Journal*, May 12, 1980)

The Overthrust Belt represents a mountain building period, lasting from late Mesozoic to early Tertiary. Compressional forces to the west sheared off massive sections of sedimentary rocks and pushed or thrusted them eastward over adjacent sedimentary sections. The Keystone Thrust is a prime example of this movement. In some localized instances these sheets were pushed from 50 to 70 miles, but not necessarily as one solid sheet. The Overthrust Belt does not consist of a single overthrust plate, but instead, of an overlaping system of thrusts with many plates. Other changes in geologic formations, primarily folding and truncation, occurred with the thrusting, on a grand scale. Thus, many types of structures formed which could allow accumulation of oil and gas. Recent discoveries in Wyoming and Utah trend to substantiate this hypothesis. Most of the finds in these states have been along the eastern edge of the Overthrust Belt in formations which are generally post-Jurassic. Rocks younger than Jurassic, Cretaceous and Tertiary, are not present in the RRCRL area (See Figure 3-1). However, this does not necessarily preclude hydrocarbon accumulation. In southern Nevada the overthrust system is further complicated by intrusions of molten rock, volcanic activity and block faulting, conditions which characterize the Basin and Range Province.

Since 1929, more than 40 wildcat oil and gas exploration wells have been drilled in Clark County. Figure 3-7 shows the locations of these efforts and Table 4-5 provides some basic data on each well. Most were shallow wells. The average depth of the 42 wells is 2,090 feet. The deepest, number 59 on the table, went to 8,508 feet.

Three of the wells reported "shows" of oil. (A "show" is defined as a trace of oil or gas detected in a core, cutting, or drilling mud or in geophysical logs run on a well.) The shows were made in well number 58 near Arden which went to a depth of 2,020 feet, well 59 near St. Viator's Catholic church at the intersection of Flamingo Rd. and Eastern Ave., and well number 62 between the Muddy Mountains and Black Mountains, which was drilled to 5,919 feet. One well, number 56 near the intersection of Interstate Highway 15 and the valley of fire Road (Nevada Route 40) had a show of gas. It was drilled to 5,085 feet in 1954 and redrilled to 3,496 feet in 1973.

Each of these wells which reported shows also reported geological formations similar to those found in the RRCRL.

In addition to the well data, there are two instances of natural, surface evidences of petroleum. In the Goodsprings area, asphaltic material has been observed in the Sultan Limestone formation that runs from Goodsprings through the RRCRL. In Rainbow Gardens, an area to the east of Las Vegas behind Sunrise Mountain, tarry residues have been observed in the Moenkopi formation, which is also found in the RRCRL.

The most recent oil and gas activity in Southern Nevada has been a well drilled on Mormon Mesa by Mobil Oil Co. Begun in September, 1979 with the intention of going to 20,500 feet, the well was abandoned in May, 1980 at a depth of 19,562 feet. BLM has no; information on Mobil's drilling experience.

The Eagle Springs and Trap Spring Fields, located some 200 miles north of Las Vegas near Ely, both produce medium viscosity, high sulfur crude from a depth of approximately 7,000 feet. The producing formation is fractured Tertiary volcanics. It is generally believed that this field is unrelated to the Overthrust Belt fairway. The hypothetical trapping mechanism in the RRCRL would be a particular type of faulting rather than volcanic rocks.

The nearest producing field to the RRCRL on the Overthrust Belt is the Virgin Field located northeast of St. George, Utah, about 110 miles northeast of Las Vegas. This field, in production intermittently since 1907, has three wells, two of which produce low viscosity, low sulfur oil. The other produces medium visocity, high sulfur oil. The production formation for all wells is the base of the Triassic Moenkopi formation. The deepest well drilled in this field went to 4,538 feet.

As yet, very limited geophysical work and no drilling has been done in the RRCRL. Without access to the geophysical maps, it is difficult to comment on the area's oil and gas potential, except that hydrocarbon discoveries have been made in other parts of the Overthrust Belt of which the Keystone Thrust is a part. Geophysical work would certainly shed some light on the area's potential, but only drilling will prove or disprove the presence of oil and/or gas.

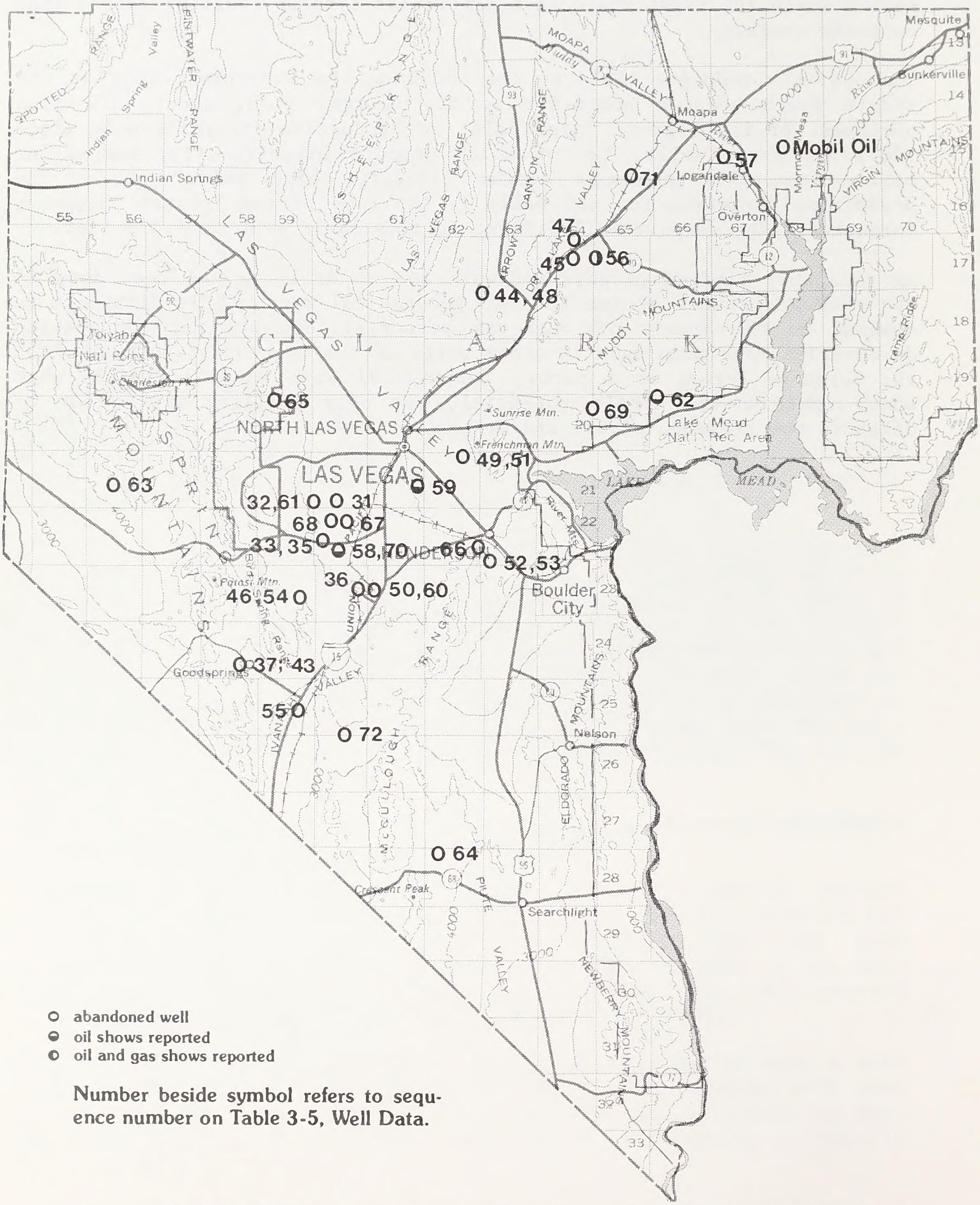


Figure 3-7. Wells drilled for oil and gas in Clark County, Nevada through 1979. (Modified from Garside and Shilling, 1977.)

TABLE 3-5
DATA ON WELLS DRILLED IN CLARK COUNTY FROM 1929 to 1979

31. E. W. BANNISTER No. 1, 1929, 522 ft.
32. COMMONWEALTH OIL CO. No. 1, 1933, 1897 ft.
33. L. M. HATFIELD No. 1, 1935, 707 ft.
34. RED STAR OIL CO. J. B. Nelson No. 1, 1943, 2210 ft.
35. RED STAR OIL CO. J. B. Nelson No. 2, 1943, 3767 ft.
36. NEVADA EXPLORATION CO. Porter No.1, 1947, 2002 ft.
37. NEW HAVEN OIL CO. No.1, 1947, 716 ft.
38. NEW HAVEN OIL CO. No. 2, 1947, 405 ft.
39. NEW HAVEN OIL CO. No. 3, 1947, 200 ft.
40. NEW HAVEN OIL CO. No. 4, 1947, 226 ft.
41. NEW HAVEN OIL CO. No. 5, 1947, 40 ft.
42. GOODSPRINGS OIL CO. No. 1, 1948(?), 370 ft.
43. NEW HAVEN OIL CO. No. 6, 1948, 130 ft.
44. UNITED PETROLEUM CORP. Apex No. 1, 1948, 1247 ft.
45. G & G EXPLORATION CO. No. 1, 1949, 1130 ft.
46. BLACK GOLD OIL AND GAS EXPLORATION CO. Golden Spike No. 1, 1950, 950 ft.
47. LAST CHANCE OIL CO. Crystal No. 1, 1950, 1002 ft.
48. SOUTHERN NEVADA OIL INVESTORS CO. Apex No. 1, 1950, 1455 ft.
49. McAULEY ASSOCIATES No. 1, 1952, 1970 ft.
50. BIG BASIN OIL CO. Govt. No. 1, 1953, 2000(?) ft.
51. McAULEY ASSOCIATES No. 2, 1953, 3000 ft.
52. LEONARD WILSON Govt. No. 1, 1953, 810 ft.
53. LEONARD WILSON Govt. No. 1A, 1953, 1466 ft.
54. INTERMOUNTAIN ASSOCIATES INC. (Arden Dome) No. 1 (No. 1X), 1954, 3293 ft.
55. INTERMOUNTAIN ASSOCIATES INC. (Jean) No. 1, 1954, 2273 ft.
56. SOUTHERN GREAT BASIN OIL & GAS INC. Govt. No. 1, 1954, 5085 ft. (redrilled as JOHN A. HAEBER Adam No. 1, 1973, 3496 ft.)
57. MOAPA NEVADA OIL & GAS CO. Logandale No. 1, 1955, 575 ft.
58. U.S. OIL CO. (MATADOR OIL CO.) Wilson No. 1X, 1955, 2020 ft.
59. JOE W. BROWN Wilson Govt. No. 1, 1956, 8508 ft.
60. W. T. SMITHDALE JR. U.S. Lease No. 1, 1956, 300 ft.
61. BONANZA OIL CORP. Arden Dome No. 1 (Consolidated Govt. No. 1), 1959(?), 3260 ft. (redrilled as TIME PETROLEUM INC. Federal No. 31-1, 1971, 3260 ft.)
62. SHELL OIL CO. Bowl of Fire Unit No. 1, 1959, 5919 ft.
63. TRI-STATE OIL EXPLORATION CO. Miskell-Govt. No. 1, 1959, 2602 ft.
64. OSCAR BRAY No. 1, 1961(?), 840 ft.
65. C. J. LICHTENWALTER & C. M. TURPIN Turpin No. 1, 1961, 777 ft.
66. TRANS-WORLD OIL CO. (LEONARD WILSON) Houssels-Wilson-Milka No. 1, 1962, 2300 ft.
67. EQUALITY OIL CO. (ARDEN DOME OIL CO.) Chadek No. 1, 1964 1627 ft.
68. JACK F. GRIMM (MINERALS DRILLING INC.) Wilson No. 1, 1965, 5686 ft.
69. ROSEN OIL CO. Muddy Dome (Federal) No. 1, 1965, 5666 ft.
70. KAMARDEN OIL & GAS LTD. KOG-1, 1969, 6755 ft.
71. C. P. PHELPS No. 1, 1970, 1625 ft.
72. SANDIA INTERNATIONAL METALS CORP. Duff No. 1, 1971, 438 ft.

"Mobil Oil" MOBIL OIL CO. Virgin River #1A USA , 1979, 19562

LIVING COMPONENTS

VEGETATION

The land surface of the RRCRL supports a wide variety of plant species. This variety is due to: soil types and depth, elevation, exposure, temperture, precipitation, and existing and past use.

An area that supports vegetation and has one or more dominant or co-dominant species is identified as a vegetation type, usually named after the dominant or most abundant species. Vegetation types vary greatly in the number of species and in the percentage of each species in the total composition. The vegetation in the RRCRL can be divided into nine major vegetation types: Pinyon-Juniper, Joshua Tree, Rabbitbrush, Oakbrush, Blackbrush, Manzanita, Desert Shrub, Unique Vegetation, and Barren. Locations of each are shown on the "vegetation type" map. The following discussion describes each of these major vegetation types (BLM Range Inventory, 1979).

Pinyon-Juniper Type

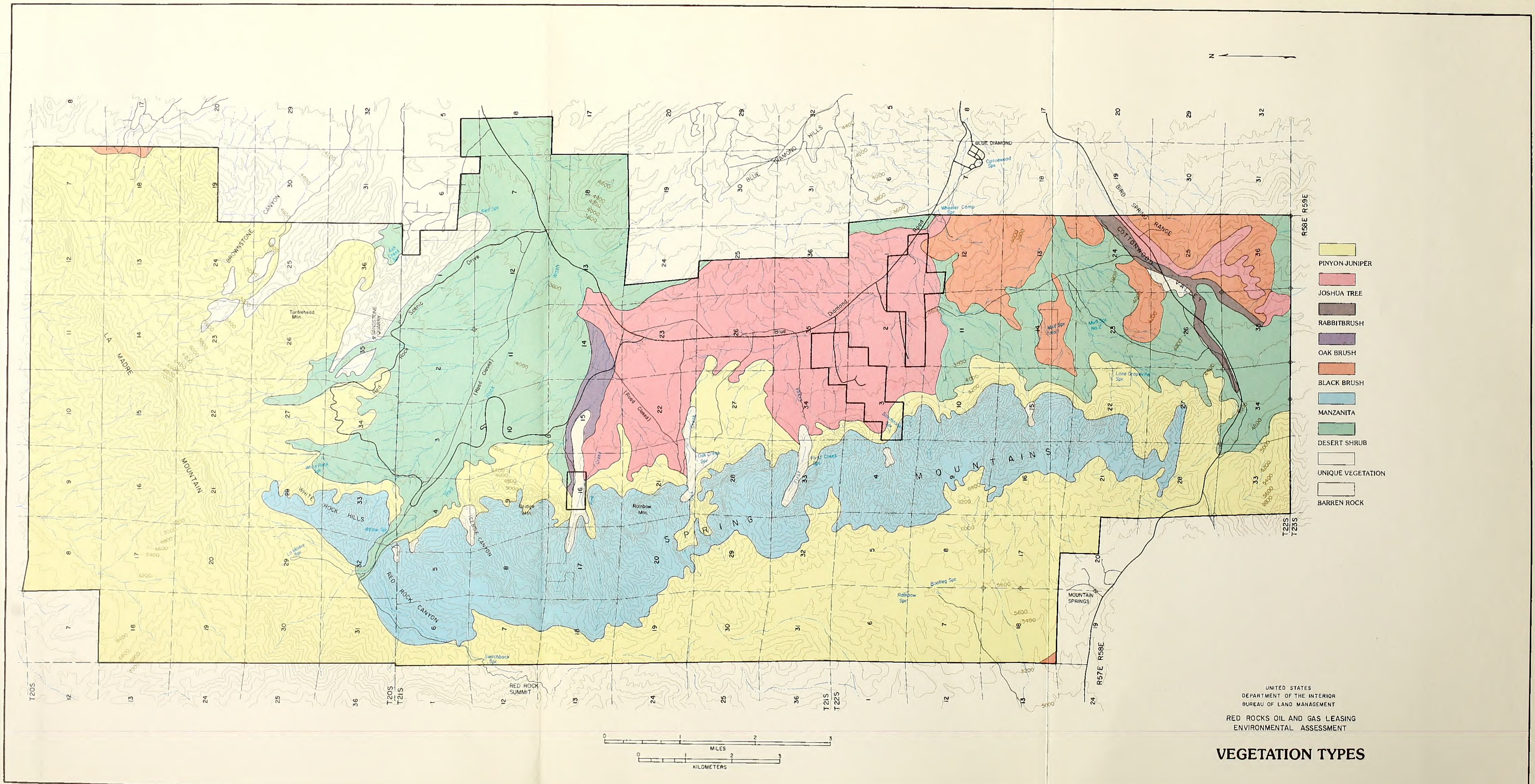
This type lies between 5,000 and 7,000 feet and receives between 10 to 18 inches of precipitation a year. The type forms a belt between the desert below and the true forest above. Precipitation is the first, and soil shallowness the second, limiting factor. The lower edge of the belt is occupied by juniper, but at higher elevations, pinyon pine and juniper intermix. At the upper edge of the belt, pinyon pine becomes prevalent. Curlleaf mountain mahogany, big sagebrush and blackbrush are also found in this type in varying amounts. Three awn, Nevada bluegrass, and cheatgrass make up the majority of the grass species present.

Joshua Tree Type

This type is found between 3,600 and 4,200 feet and receives between eight and ten inches of precipitation annually. Soils are moderately deep to deep. Joshua tree is the dominant species in this type and makes up a fair amount of the total species composition. 3 to 10%. Black-brush, creosote bush, Morman tea, and burrobrush also make up portions of this type. Grasses are usually sparse and species are mostly annuals.

Rabbitbrush Type

This type can range between 3,400 and 9,000 feet elevation but in this area is found between 3,400 and 4,200 feet. Precipitation usually is low, ranging from six to eight inches. Rabbit brush is generally found on eroded or disturbed soils along roadsides and in wash bottoms. It characterizes a soil with a relatively low alkali content.



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VEGETATION TYPES

Oakbrush Type

This type generally occurs from 4,000 to 6,000 feet in the RRCRL, mostly along the Pine Creek drainage. Soils are moderately deep to deep. Precipitation is usually between eight and ten inches. Sagebrush, manzanita, snowberry and rabbitbrush are some of the shrub species that also occur in this type in varying amounts. Nevada bluegrass, Indian ricegrass and big galleta, as well as several annual grasses and forbs, also occur in this type. Soil differences and soil moisture, as affected by slope and aspect, probably account for the oakbrush occurance.

Blackbrush Type

The Blackbrush Type is usually found from 4,000 to 6,000 feet elevation. Topography is usually steep to rolling and soils are very shallow to shallow, 2 to 20 inches. This type is usually found in association with creosote, hopsage, sagebrush, and wolfberry. Precipitation is fairly low, five to eight inches per year.

Manzanita Type

This type is found in the area surrounding the escarpment in the rocky canyons and on the walls. Vegetation is only found on areas where soil has accumulated. The most limiting factor in this area is availability of soil. Precipitation usually ranges from eight to ten inches annually. Manzanita is the most dominant plant in this area. Other species which are present in this type in varying amounts are: turbinella oak, cliffrose, desert barberry, desert ceanothus, snowberry, apacheplume, juniper and pinyon pine. Various annual grasses and forbs also occur on areas where soil has accumulated.

Desert Shrub Type

The Desert Shrub Type is found generally to the east of the sandstone escarpment. Precipitation is generally five to eight inches annually. Soils are generally shallow to very shallow. Species found in this community consist of Spanish bayonet, blackbrush, Mormon tea, cheesebush, spiny memodora, desert almond, sagebrush, bursage, cholla cactus, dalea, turpentine bush, and catclaw. Grasses commonly found include needle grass, sand drop seed, and big galleta grass.

In the Desert Shrub Type, moist years produce an exceptional growth of annual plants. The wide variety of small flowering plants include buckwheats, marigolds, mallows, and desertpoppy. Several species of annual grasses also occur in moist years.

Barren Type

This type is found on the eastern edge of the RRCRL and is mostly bare rock. Vegetative cover is found only in areas where soil accumulates and where water periodically stands, allowing seed germination. The main species are pinyon pine, juniper, manzanita, sagebrush, snakeweed and creosote. Some very sparse perennial grasses occur, along with some annual grasses and forbs.

Unique Vegetation Types

This type is limited mainly to the deep, cool, well watered canyons of the escarpment. These canyons, especially Pine Creek, Oak Creek and First Creek, provide a micro-climate that supports small communities of ponderosa pine and several other species not commonly found at this low an elevation. Some of these other species are: willow, serviceberry, snowberry, manzanita, sagebrush, rabbitbrush, desert almond, desert peach, black cottonwood, and gambles oak. Nevada bluegrass, Indian ricegrass, blue grama, and big galleta make up some of the grass species found there.

The average age of the ponderosa pine in these areas is 180 years (BLM Forest Inventory, 1979). Reproduction is marginal the trees are mostly concentrated in and along the wash and creek bottoms. They may represent a relic population once part of a larger pine forest. For unknown reasons these trees have survived in these small pockets long after the rest of the forest disappeared.

In the past 40 years, many unique plants in the area have been subjected to heavy collection pressure. The sword-fern, which was probably the most collected plant in the area, has been reduced by trampling and collection from large beds and glades to only occasional plants (Vincent, 1974).

Other unique plants in the area include agave (Agave utuhensis nevadensis), a conspicuous part of the cliff community, which occurs in the Spring Mountains, of which the RRCRL are a part, and the Ivanpah, Clark, and Kingston Mountains of adjacent California (Breitung, 1968). The Charleston Mountain pricklypear cactus (Opuntia Charlstonensis) occurs only in the higher elevation wooded areas of the Spring Mountains (Bradlay and Deacon, 1965).

Riaprian vegetation is associated with springs, creeks, and dry washes. Plants more typical of the Riparian Type include mesquite, catclaw acacia, saltcedar and desertwillow. In moister areas, or along stream banks, can be found cattails, rushes, willows and other semi-aquatic plants. These unique type are also delineated in the "Vegation Type" Map.

Threatened or Endangered Plants

There are no known Threatened or Endangered Plant Species in the RRCRL, although there are several species which might in the future be listed in the Federal Register as candidate species. Table 3-6 lists plants which could be found in the RRCRL and which the U.S. Fish and Wildlife Service's (USFWS) Endangered Species Office identified as having tentative candidate status. This status will be published in the revised Notice of Review in the Federal Register sometime this Spring (See Appendix D, informal consultation letter from USFWS.

TABLE 3-6

Tentative Candidate Threatened/Endangered Plants Possibly Found in RRCRL

Species	Tentative Candidate Status
Angelica scabrida	Threatened
Arctomecon merriamii	Species of Concern[a]
Astragalus remotus	Not being considered at this time
Coryphantha vivipara var. rosea	Threatened
Cryptantha insolita	Endangered[b]
Cryptantha tumulosa	Threatened
Opuntia whipplei var. multigeniculata	Threatened
Penstemon bicolor bicolor	Threatened
Penstemon bicolor roseus	Threatened
Penstemon thompsoniae jaegeri	Threatened

[a]USFWS is monitoring this species to determine if future protective actions are warranted.

[b]Cryptantha insolita, which could be found in the RRCRL, is listed by the State of Nevada on its Critically Endangered Species list.

Surface Rehabilitation Potential

Surface rehabilitation on areas disturbed by drilling, roadbuilding, seismic activity, and mud reserve and circulation pits, varies in difficulty and degree of expected success throughout the RRCRL. This is due to differences in soils, (including depth, fertility, and classification), native vegetative communities, topography, and climatic factors (i.e. precipitation, tempreture, and frequency of drought). Appendix E lists a few rehabilitation Techniques which could be used in the RRCRL.

Three levels of rehabilitation potential were identified. These three levels are: 1-High potential, 2-moderate potential, and 3-low potential areas having these dirferent levels are shown on the "Surface Rehabilitation Potential" Map. The following factors were determined to be essential criteria effecting an area's ability for rehabilitation.

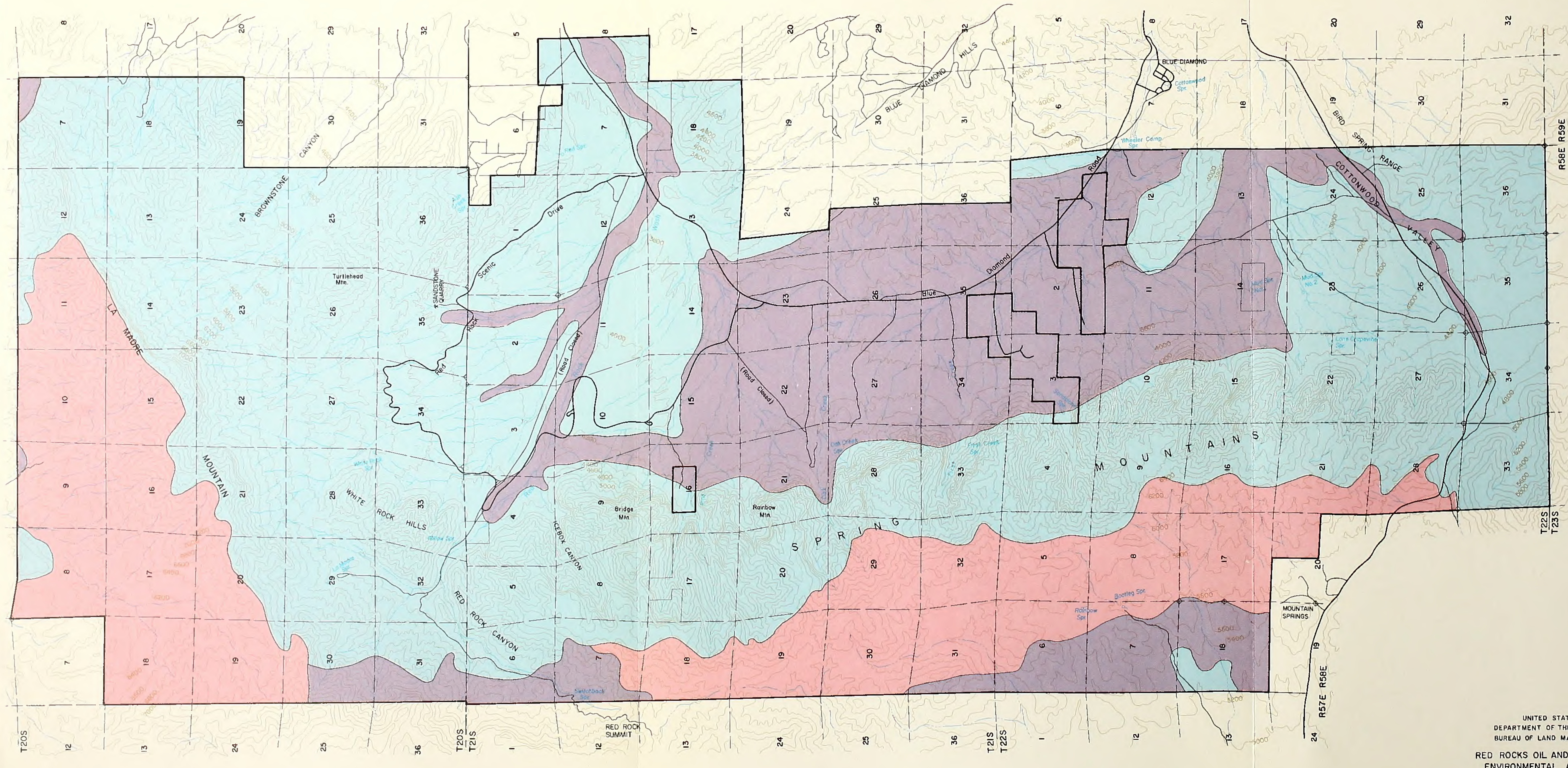
Level 1-High: Rainfall is relatively high (12 to 17 inches); soils are deep to moderately deep (60 to 20inches); organic content is a significant component (more than 2% in the surface layer) of the soil. Most of the vegetation in the Level One Class consists of mature pinyon pine, juniper, sagebrush, three awn grass and black brush, along with several species of annual grasses and forbs. Areas within this level can probably be rehabilitated to native vegetation with a minimum amount of effort.

Because these areas are on better soils and in a higher rainfall area, the vegetation type's natural regeneration powers would probably revegetate disturbed sites fairly rapidly (five to ten years). Seeding with non-native species to re-establish soil cover on disturbed sites should also work well on areas within this level.

Level 2-Moderate: Within this level, soils are moderately deep to deep (20 to 60 inches) but have very little organic matter in the surface layer (0-1%). Precipitation is moderate (eight to ten inches). The vegetation in this level consists of Joshua tree, yucca, burrobush, and in lower elevations, cresote bush, along with several species of annual forbs and grasses. Because of the nature of these species, the soils, and the precipitation, natural revegetation would be very slow (25-50 years). Commercial seed sources are relatively unavailable. Some areas within this level could probably be rehabilitated with exotic species.

Level 3-Low: In this level, precipitation is fairly low (five to eight inches). Temperatures often exceed 100° and droughts are frequent. The topography is steep to rolling and the soils are very shallow to shallow (two to twenty inches) reaching to either hard pan or bedrock.

These areas probably can not be expected to return to native vegetation after a surface disturbance in any reasonable period of time (10-15 years) and might not show any change in as much a 50 years. Reseeding with non-native shrub and/or grass species would require considerable effort. The success rate of these type seedings would be very low due to the nature of the soils and climatic factors.



HIGH POTENTIAL FOR REHABILITATION

MODERATE POTENTIAL

LOW POTENTIAL*

* Without significant investment of time, money and effort.

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SURFACE REHABILITATION POTENTIAL

WILDLIFE

Over 45 species of mammals, 100 species of birds and 30 species of reptiles and amphibians inhabit the RRCRL. A list of species and their habitat preferences can be found in Appendix III of FES-75-98.

The riparian and wash areas are most important in the RRCRL. The increased availability of water in these areas encourages a higher density and more variety of plants. The richer plant communities can support more species and greater populations of animals as compared to the surrounding habitat. Unpublished data from the Bureau of Land Management, California Desert Plan Program, found "bird density in washes 50-60 times that of surrounding open desert communities". The "Wildlife Habitat" Map shows these important riparian and wash areas in the Red Rocks.

Threatened or Endangered Species

The American peregrine falcon is the only Federally-listed (endangered) species known to inhabit the RRCRL.
Two state-listed rare species, desert tortoise (Gopherus agassizi), and Gila monster (Heloderma suspectum) do occur in the RRCRL.

Mammals

Bighorn Sheep (Ovis canadensis nelsoni) inhabit the RRCRL. This highly valued animal is considered a sensitive species by the Nevada Department of Wildlife (NDOW) and the BLM. Its habitat is typified by steep, rocky, mountainous terrain which allows escape from predators and provides shelter--usually rock overhangs, shelves, or caves--from adverse weather conditions. Generally sheep stay within a two-mile radius of permanent water 80 to 90% of the time during Summer months. Summer rainstorms may provide temporary water, allowing sheep to move in wider patterns for brief periods. Historically, bighorn sheep occupied most mountain ranges in southern Nevada, but now they are limited to only a few (McQuivey, 1978). The RRCRL contains approximately 44,000 acres of bighorn sheep habitat, 26,000 of which are considered crucial year-long habitat. The "Bighorn Sheep Habitat" Map indicates the range or this animal in the RRCRL. Population estimate for the area is 160 animals. Population trend appears to be upward.

The spotted bat (Euderma maculatum) is considered a rare species by the NDOW. This animal roosts in crevices of sandstone cliffs near St. George, Utah (Poche and Ruffner 1975). No extensive inventories to locate spotted bats in the RRCRL have been initiated or conducted, but the escarpment area and the existence of several springs would appear to provide very good habitat for the spotted bat (personel communications Dr. O'Farrell).

Other mammals that can be found in the RRCRL include mule deer, cottontail and jackrabbits, antelope ground squirrels, coyotes, and kit foxes.

Birds

Several bird species in the RRCRL have special status. All the species of the order Falconiformes and Strigiformes are as protected in the State of Nevada. They include the golden eagle, prairie and peregrine falcons, American kestrel, cooper's hawk, red-tailed hawk, sharp-shinned hawk, great-horned owl, long-eared owl, screech owl, and turkey vulture. The "Wildlife Habitat" Map shows important raptor habitat.

Several other species of birds inhabiting the Red Rock area have restricted ranges or are present in low numbers in the Southwest. They include the tree swallow, Hammond's and dusky flycatchers, Le Conte's thrasher, gray vireo, Cassin's finch, and black-chinned, white-crowned, and song sparrows.

Other birds that inhabit the Red Rock area include Gambel's quail, mourning doves, road runners, and jays.

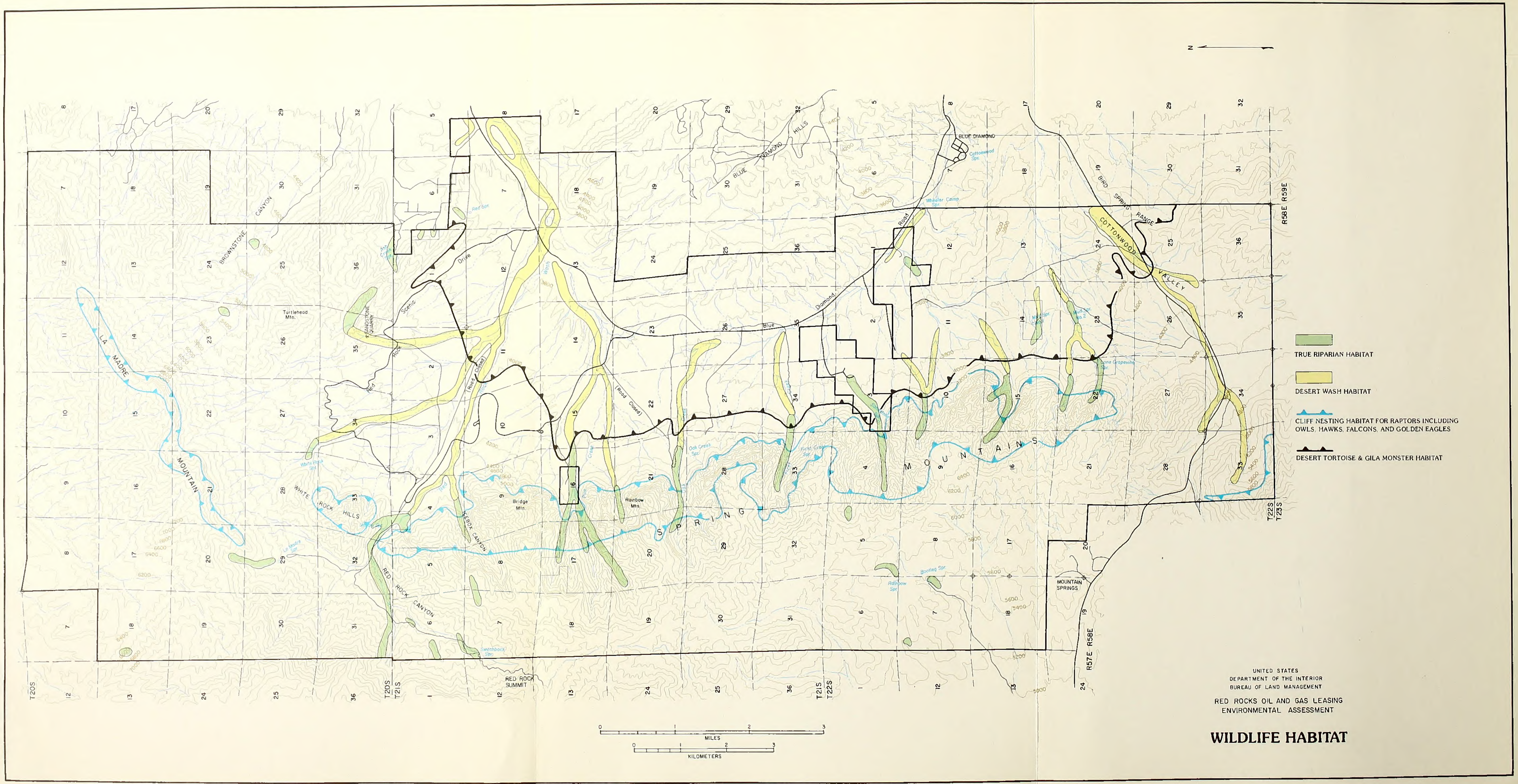
Reptiles

The desert tortoise (Gopherus agassizi) inhabits the RRCRL and is considered a rare species by the State of Nevada It is usually associated with cresote or cresote-blackbrush bajadas. Washes are important denning areas. The "Wildlife Habitat" Map indicates the desert tortoise habitat in the RRCRL. Population estimates from a study being completed in Clark County for the BLM suggest the Red Rocks has a medium denisity of animals (50 to 100 tortoises per square mile). Population trend for the desert tortoise in the RRCRL area is not presently known.

The Gila monster (Heloderma suspectum) is another rare species that can be found in the RRCRL area. Scientific specimens of the Gila monster have been collected in the Red Rocks. The range of this animal appears to be below 4000 feet in elevation with rocky and/or sandy washes being preferred habitat (Deacon and Bradley, 1965). Population size and trend for the Gila Monster in the RRCRL area is not known at this time.

Amphibians and Fish

Two species of amphibians, the red spotted toad (Bufo punctatus) and the Pacific treefrog (Hyla regilla) inhabit areas near water in the RRCRL. No native fish are known to inhabit any waters occuring on public land within the RRCRL.


TRUE RIPARIAN HABITAT
DESERT WASH HABITAT
CLIFF NESTING HABITAT FOR RAPTORS INCLUDING OWLS, HAWKS, FALCONS, AND GOLDEN EAGLES
DESERT TORTOISE & GILA MONSTER HABITAT
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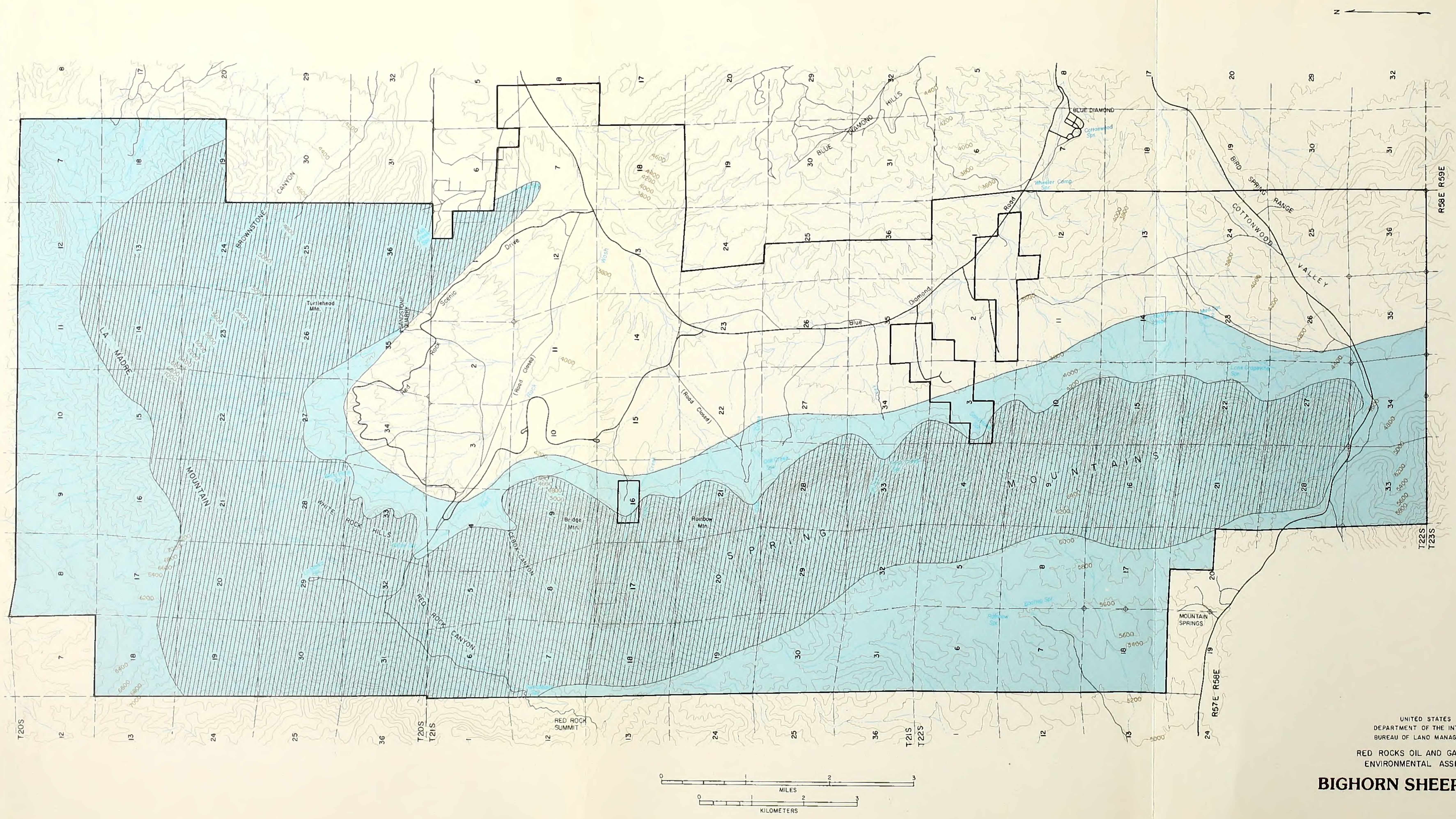
WILDLIFE HABITAT
MILES
KILOMETERS
BLUE DIAMOND
BLUE DIAMOND HILLS
BIRD SPRING RANGE
COTTONWOOD VALLEY
SPRING MOUNTAINS
LA MADRE MOUNTAIN
WHITE ROCK HILLS
BROWNSTONE CANYON
RED ROCK CANYON
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
MOUNTAIN SPRINGS
RED ROCK SUMMIT
T20S
T21S
T22S
T23S
R57E R58E
R58E R59E



BIGHORN SHEEP HABITAT

CRUCIAL YEARLONG HABITAT

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BIGHORN SHEEP HABITAT

WILD HORSE AND BURROS

An estimated 20 horses and 25 burros live within the boundaries of the RRCRL. Their range extends from the southern boundary of RRCRL to the vicinity of Spring Mountain Ranch State Park. The areas around perennial waters are those most frequented by both species (See the "Waters and Flood Hazard" Map for water locations). The burro can be found closer to human activity such as the Blue Diamond Dump, Bonnie Spring Ranch and Old Nevada, and Spring Mountain State Park. The horses generally use the more remote areas to the southwest of the town of Blue Diamond near Mud Springs. The wild horse and burro population has remained fairly constant for the past three to four years. A few burros have been killed by vehicles when the animals stray onto the highways. Five burros died in 1979 near the town of Blue Diamond but no cause has been identified.

HUMAN VALUES

VISUAL RESOURCE

General

The unique combination of geologic landforms, relatively unspoiled panoramic vistas, micro-environments in canyon bottoms--some resulting in isolated pockets of vegetation not normally associated with the Mojave Desert Environment--have created the landscape found in the RRCRL. The lands are arid for the most part, with only a few perennial springs, normally found in the canyons. Subtle variations in texture exist. The main scenic attractions of the RRCRL are the 2,000-to 3,000-foot-high sandstone cliffs traversing most of the length of the RRCRL and the Calico Hills with their unusual iron oxide colorations and interesting textural patterns. Occasional sightings of bighorn sheep in the Willow Springs area or burro sightings in the south end of the recreation area add to the visual experience of the RRCRL.

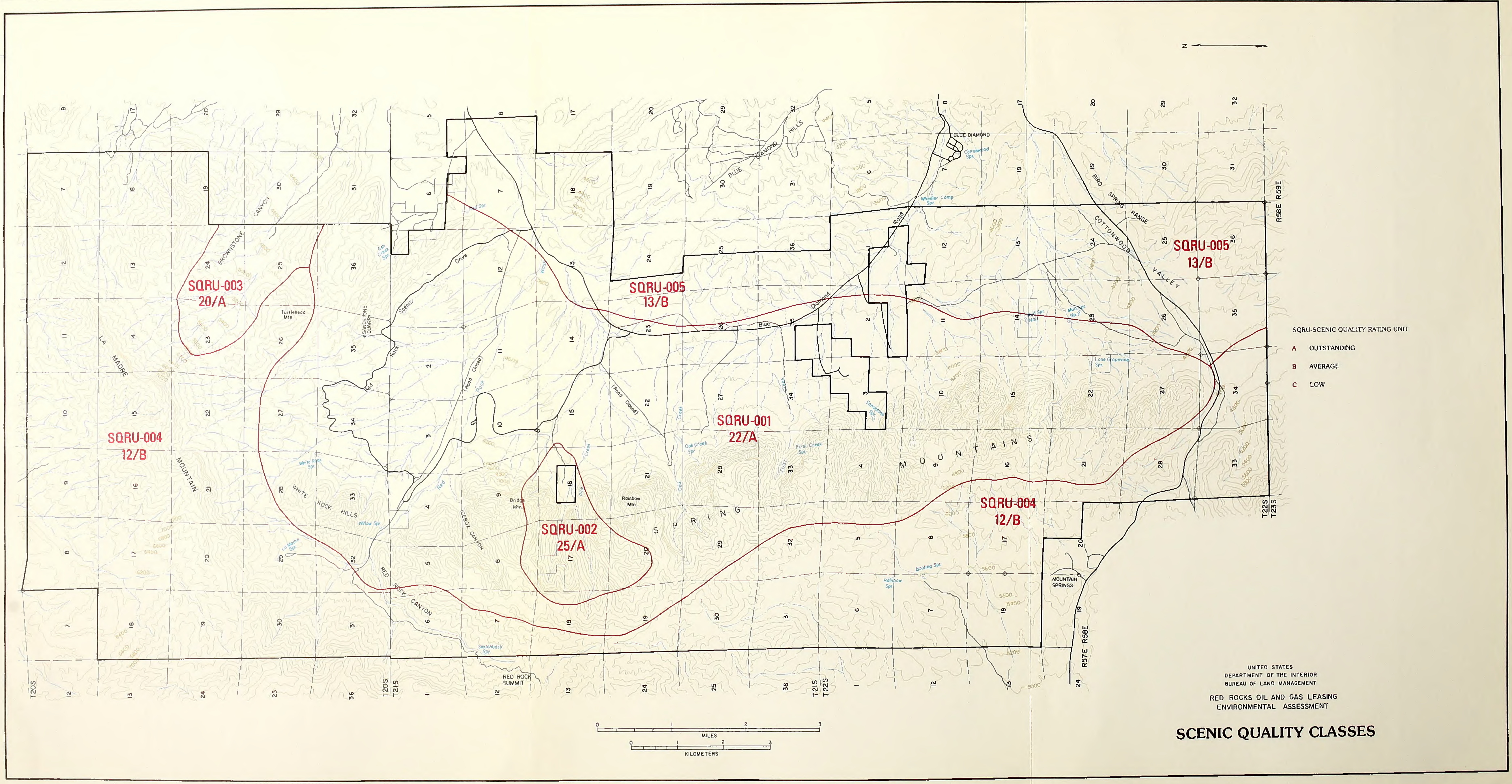
The scenic value of the RRCRL and their proximity to a major urban center were the main factors considered when 60,910 acres were segregated on October 5, 1967. The Unit Resource Analysis (URA) of the Stateline Planning Unit identified the Spring Mountains and Red Rock Canyon Area (rating units QSsc-042 and QSsc-040) as "A" or high scenic quality areas. Reference to the scenic amenities of the Red Rock area are found in other portions of the URA. The Red Rock bluffs (rating area QPpr-016) was identified as an area possessing potential primitive values because "this area contains outstanding scenery..." The sightseeing-geological portion of the URA, in discussing the escarpment (rating area QSgo-027 and QSgo-028) identifies "magnificent sandstone formations" and describes how "...massive sandstone bluffs form the back-drops and much of the attraction of the Red Rocks area."

The URA states the RRCRL and Spring Mountains "...contain the most significant scenic qualities within the Stateline Planning Unit" and recommends "all efforts should be made to maintain these scenic qualities through the exclusion of <u>any</u> developments which might detract from these qualities."

The background report of the Red Rock master plan (Royston Hanamoto Beck & Abbe, 1976) indicates that, when visitors were polled by the State of Nevada and asked which activities they desired in the RRCRL, the first choice was sightseeing.

Analysis Process

The BLM Visual Resource Management System was used to analyze the visual resources within the study area and to recommend management classes for the scenic values there. Five scenic quality rating units (SQRU) were identified. They are described below and depicted on The "Scenic Quality class" Map. (For methodology see BLM Manual 8430 and Appendices F, Scenic Quality Rating Criteria and RRCRL Field Inventory Sheets, and G, BLM's Visual Resource Management system.)



SCENIC QUALITY CLASSES

SQRU-001 - Class A

The sandstone cliffs and valley floor were grouped into a single rating unit since this area represents the general public's perception of the extent of the RRCRL. This rating unit can be differentiated from the other units by the open character of the area. Visitors can view almost the entire escarpment from virtually any location within the rating unit. The spectacular proportions of the escarpment are enhanced by the broad, gentle sweep of the valley up to the base of the sandstone bluffs which extend for more than 12 miles north and south. The escarpment is of such massive proportions that some portion of it is visible from almost everywhere within the Las Vegas Valley.

A broad, horizontal band of maroon-colored sandstone runs across the face of the escarpment. Many other horizontal bands of subtle colors may be found on closer inspection. Time, and the effects of wind and rain, have left their mark on these monolithic blocks. The walls are deeply incised and wrinkled. Black streaks darken the cliff faces where seasonal rains pour out of the cracks creating numerous small waterfalls, some hundreds of feet high. Large dark patches of desert varnish occur along the lower limits of the escarpment. Barren domes, huge potholes, a natural bridge, beehives, and many other unusual rock forms are found at the summits. What little vegetation is found on the cliffs clings tenaciously to the rock in the many nooks and crannies where some soil has collected.

Alluvial terraces buttress the bases of these massive cliffs. Littered with boulders, junipers dotting the slopes, and an occasional rock ledge pushing up out of the vari-colored soils, these talus slopes have a coarser texture than the smooth stone face of the escarpment, or the fine textures of the valley floor.

Numerous short, Y-shaped canyons cut into the sandstone cliffs. The sheer walls drop hundreds of feet to boulder-choked canyon bottoms. A few perennial springs are found in the recesses of these canyons and splash pools contain water many months of the year. Dense and sometimes unique vegetation occurs within the micro-environments of the canyons.

The valley floor appears to be relatively smooth but is cut by numerous dry washes, the largest being Red Rock Wash. The relatively uniform vegetation creates a fine textural pattern throughout the area. Ribbons of dark-green vegetation along ephemeral drainages contrast with the light buff and grey-green of the valley floor.

Calico Hills is within the rating unit and is one of the most popular scenic attraction within the study area because of its accessibility from the Scenic Loop Road and Sandstone Quarry. Crossbedding of the buff- and rose-colored sandstone is highly visible from Calico Vista.

Many recreationists scramble between the huge sandstone formations and hike through the wash at Sandstone Quarry to an area known as Hidden Lake. Hidden Lake is a small natural impoundment of water among the boulders of the Calico Hills. The relatively isolated location and undisturbed landscape enhance the visual experience.

Red Rock Scenic Loop Road was designed and built to afford the public the opportunity to view and experience the unique visual quality of the RRCRL in an unconfined and undisturbed environment.

The pastoral environment of Spring Mountain Ranch contrasts with the surrounding desert. Visible from most areas in the rating unit, the dark-green color and the soft texture of the irrigated pastures is a pleasant change. Bonnie Spring Ranch does not exert a dominant influence in the rating unit because of its rustic character and low visibility. Oliver Ranch also falls in this category.

The trash dump in Section 12 near Blue Diamond does not have a significant effect on the area because it is well screened from view by surrounding hills.

The Scenic Loop Road, Blue Diamond Road, and Pahrump Highway (State Highway 16) cross various portions of the SQRU and are high sensitivity travel corridors. (See Table 3-6).

Spring Mountain Ranch State Park is also a high sensitivity area. Lands within a line of sight (up to three-mile radius) of these use areas are subject to continual scrutiny by the general public.

<u>SQRU-002 - Class A</u>

Pine Creek Canyon was identified as a separate rating unit because the canyon bottom posesses a microclimate so unique that vegetation--such as ponderosa pine normally found at elevations of 7,500 feet or higher--has been able to thrive at the 4,000-foot-elevation desert floor. A perennial water source and the cool, shaded canyon have created this out-of-place biome. Oak, silktassel, manzanita and wild grape cover the slopes above the stream and host many forms of wildlife. The north fork of the canyon has been set aside to preserve and study this unique environment. There are no current man-made intrusions within the SQRU. An old abandoned road leading to the mouth of the canyon was closed and partially rehabilitated after completion of the Scenic Loop Road and Pine Creek Overlook.

Pine Creek Canyon has been determined to be a high sensitivity area because of its proximity to the Pine Creek Overlook and the designation of a portion of the canyon for protection as a Research Natural Area.

SQRU-003 Class A

The Brownstone Canyon rating unit is relatively small and terminates in the talus-and pinyon-juniper-covered slopes of LaMadre Mountain. The rating unit does not extend much above the 5,600-foot contour. Buff and light-brown sandstones are massed along the south edge of the rating unit. Some iron-oxide-stained, maroon sandstone also is found in the canyon. Dark green juniper and manzanita stand out against the light colored sandstone. Large isolated sandstone formations spring out of the valley floor, limiting viewing distances up the basin. The smooth, rounded forms and the light-colored sandstone clearly standout against the dark-grey of the soils, derived from limestone parent material, and the dusty green foliage in the upper basin.

Use-volume in the Brownstone Canyon is low (See Table 3-7), averaging about 11 visitors a day. Most of the visual resources associated with Brownstone Basin are much less visible and accessible than those in SQRU-001. Accordingly, the area has been classed as having low sensitivity.

SQRU-004-Class B

The next rating unit within the study area includes the limestone cliffs of LaMadre Mountain, the west slope of the Sandstone Bluffs, LaMadre Canyon, and Red Rock Canyon, a narrow canyon on the west side of the escarpment.

The sawtoothed ridge, and very coarse, dark-grey cliffs of LaMadre Mountain provide a pleasant background for the colorful sandstone formations in SQRU-001. The north slope of LaMadre Mountain is pinyon and juniper covered, and seldom seen.

LaMadre Canyon is relatively confined. Access through Rocky Gap is difficult and rough, keeping recreation use volume low. This could change to a high use volume if the RRCRL Master Plan is implemented.

Broad flat areas, a fine, dense stand of pinyon and juniper, and the finely chiseled and sculptured formation of White Rock Hills (in SQRU-001), make a pleasant setting. Red Rock Canyon and the Summit Road begin in LaMadre Canyon. The latter is a narrow 4-wheel drive road.

The back side of the sandstone bluffs is a well drained, rough landscape with a good stand of pinyon pine and juniper softening the coarse character of the low rolling hills. The soils are dark-grey, derived from the limestone overlaying the sandstone formation that is the escarpment. Access to this portion of the rating unit is gained by the Lovell Canyon Road, a well maintained gravel road, or from the Mountain Springs area along poorly maintained trails. The Red Rock Summit Road, previously maintained by the BLM, and now barely passable by 4-wheel drive, drops from the Lovell Canyon Road down through Red Rock Canyon into LaMadre Canyon and on to the Willow Spring picnic area. While access is available to some areas within SQRU-004, it is not often used. The total "seen" area is limited by poor access, the broken topography, and vegetative screening throughout most of the area.

SQRU-005-Class B

This unit encompasses Blue Diamond Hill and the many low hills and ridges along the east RRCRL boundary. The portions of this rating unit within the study area are characterized by dark-grey, precipitous, limestone cliffs in the area of the Cave at the north end of Blue Diamond Hill, and low rolling foothills along the west slope.

Flintkote's Blue Diamond Gypsum Mine is located on top of Blue Diamond Hill and the surface mining operations have severely altered the landscape of the hilltop. However, the portions of the SQRU within the study area have not been impacted directly by exploration or mining.

The Blue Diamond Road runs along the western boundary of the SQRU and because of the high use by recreationists and non-recreationists it is a high sensitivity travel route.

TABLE 3-7
SENSITIVITY LEVELS [a]

Location/Route	Use Volume [b]	Sensitivity Level/Weight
Brownstone Canyon	4,000	Low
LaMadre Canyon	1,000	Low
Red Rock Summit Road	2,000	Low
Little Red Rocks	1,000	Low
Red Rock Scenic Loop Road	315,400	High
Spring Mountain Ranch State Park	90,000	High [c]
Blue Diamond Road	776,000	High
Pahrump Hwy State Route-16	570,000	High

a Sensitivity level criteria from BLM Manual 8411
b Sensitivity level adjusted for seasonal use.
c 1979 Data (See Recreation)

RECREATION

General

The RRCRL contain a broad spectrum of recreation resources. Commercial recreation, wilderness, cultural resources, and the Pine Creek Research Natural Area are described elsewhere in this document. In addition to these resources, the RRCRL offers a rich array of open space corridors, natural and historical features suitable for recreation and interpretation, and areas of current and potential low level recreation development.

The 1977 Nevada Statewide Comprehensive Outdoor Recreation Plan (SCORP) emphasizes the importance of providing recreation facilities near population centers. Over 50% of Nevada's population resides in the Las Vegas Valley. Although it is only 15 miles away, the urbanized valley is perceptually removed from the RRCRL. It is a major place of escape and reuitalization for the Las Vegas area residents. The RRCRL has received attention in national media and travel guides. It is a research area for several universities throughout the country, and is an increasingly frequent stop on Southern Nevada commercial tours.

In support of its management direction in the RRCRL, the BLM has spent some 2 million in public funds to date, including salaries, road construction, EIS and Master Plan Development, etc. Another 1.2 million has been committed to the Visitor Center Construction and Interpretive contracts.

The State of Nevada has expended some 4.8 million in State and Land and Water Conservation Act Funds in development of its management plans for acqusition of Spring Mountain Ranch State Park and development of its management program there.

Following is a discussion of the recreation opportunities and use on both public domain and Nevada Division of State Parks lands within the RRCRL, and an overview of the 1976 Master Plan for the area. Two maps, "Recreation Opportunities and Uses, and "Recreation Use Zones and Wilderness Study Areas" depict these aspects of the RRCRL.

(Appendix H is a discussion of methodologies used to obtain certain figures in this section.)

Recreation Opportunities - Public Domain Lands

The RRCRL contain the highest concentration of recreation opportunities within the Las Vegas District. They range from those commonly associated with an urban park, such as picnicking and sightseeing along the Scenic Loop Road, to wilderness experiences like backpacking and rock climbing.

Picnicking. Picnicking is very popular in the RRCRL. Use is scattered throughout the area, but is concentrated in areas where vehicle access is easy and facilities are provided. Red Springs contains six tables and 25 undeveloped sites, accommodateing groups of up to 150 persons. Willow Springs contains 17 sites, each with a table and barbeque grill. There are toilets and firepits too. Sandstone Quarry is also a favorite picnic area; the rocks and wash provide more than a dozen impromptu sites.

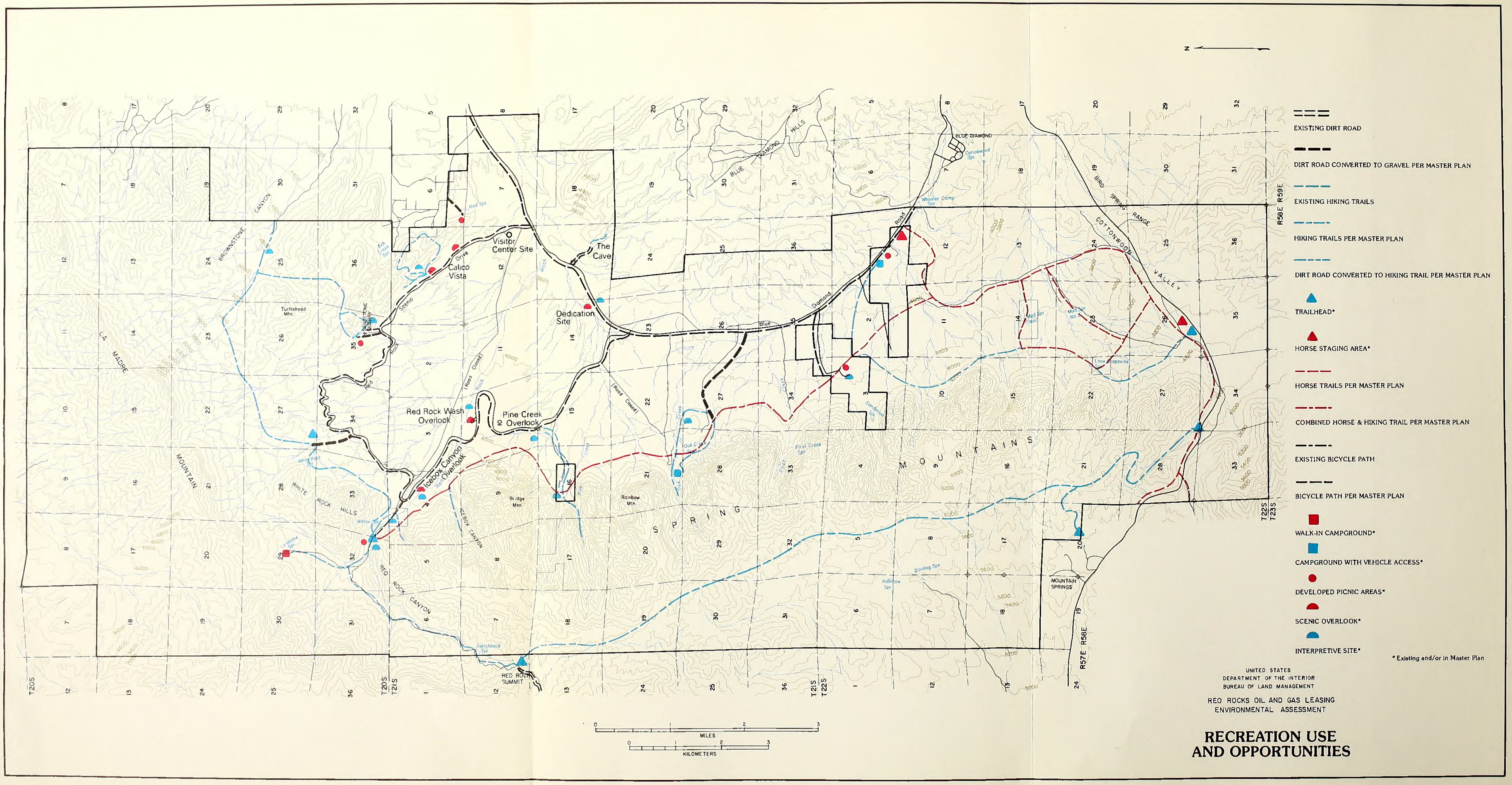
Sightseeing. Viewing the numerous natural features of the RRCRL is the area's main attraction, and is associated with nearly all of the other recreation activities there. The geology and topography exhibit outstanding form and color contrasts. Unusual flora and fauna, and a rich selection of historical sites, interest photographers, hikers, bird watchers, and motorists.

Sightseeing opportunities exist at all of the recreation sites, as well as from the main transportation routes: Blue Diamond Road, Pahrump Highway, Red Rock Summit Road, and the Scenic Loop Road. The Loop, heavily used on weekends, provides probably the best view of all facets of the valley floor, the escarpment, Calico Hills, and La Madre Mountain. Scenic overlooks along the road allow visitors to stop for a longer view. Red Rock Vista offers a panoramic view of the sandstone bluffs and Canyon Floor. It is regularly frequented by tour buses and visiting dignitaries.

Hiking. Opportunities for hiking range from short walks along tree-covered banks to strenuous climbs within the La Madre Range. Developed trails exist at Calico Vista, Willow Springs, the Cave, and Lost Creek. All of the major canyons posses outstanding opportunities for hiking and exploration, and receive heavy use. Footpaths provide access into several popular areas: Sandstone Quarry, Whiterock Spring and LaMadre Spring. Backpackers and hunters hike into the LaMadre Mountains and to the top of the escarpment, particularly to Hidden Forest.

Horseback Riding. The area receives moderate use for horseback riding. A network of unimproved dirt roads and washes, particularly in the southern portion of the RRCLR offers good riding opportunities for both individual equestrians and groups. Two horse endurance races are held annually in the area.

Climbing. Local rock climbers feel the type of sandstone formations found in the RRCRL are among the best in the world. At least 120 different routes have been identified in the area. The west side of the escarpment offers the only climb in the Southern Nevada area requiring longer than one day to complete. Three local outfits, at least one from out of state, and the U.S. Army are known to be instructing technical climbing classes in the RRCRL. Individual climbers as well as small groups also practice in the area. Other popular climbing areas include Sandstone Quarry, Willow Springs, Ice Box Canyon, and Oak Creek Canyon.



EXISTING DIRT ROAD
DIRT ROAD CONVERTED TO GRAVEL PER MASTER PLAN
EXISTING HIKING TRAILS
HIKING TRAILS PER MASTER PLAN
DIRT ROAD CONVERTED TO HIKING TRAIL PER MASTER PLAN
TRAILHEAD*
HORSE STAGING AREA*
HORSE TRAILS PER MASTER PLAN
COMBINED HORSE & HIKING TRAIL PER MASTER PLAN
EXISTING BICYCLE PATH
BICYCLE PATH PER MASTER PLAN
WALK-IN CAMPGROUND*
CAMPGROUND WITH VEHICLE ACCESS*
DEVELOPED PICNIC AREAS*
SCENIC OVERLOOK*
INTERPRETIVE SITE*
* Existing and/or in Master Plan
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
REO ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT
RECREATION USE
AND OPPORTUNITIES
MILES
KILOMETERS
N
Visitor Center Site
The Cave
Calico Vista
Dedication Site
Red Rock Wash Overlook
Pine Creek Overlook
Icebox Canyon Overlook
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
LA MADRE
MOUNTAIN
WHITE ROCK HILLS
BROWNSTONE CANYON
RED ROCK CANYON
ICEBOX CANYON
SPRING MOUNTAINS
BLUE DIAMOND HILLS
BLUE DIAMOND
BIRD SPRING RANGE
COTTONWOOD VALLEY
MOUNTAIN SPRINGS
RED ROCK SUMMIT
Blue Diamond Road
Scenic Drive
T20S
T21S
T22S
T23S
R58E R59E
R57E R58E

Rock scrambling, or bouldering (climbing without the assistance of special gear), is also common throughout the RRCRL, most notably in the Calico Hills, Willow Springs, and in the canyons of the escarpment.

Camping. Camping is concentrated at Oak Creek, Willow Springs, and to a lesser degree, at LaMadre Spring. Oak Creek is now the only designated camping area. Although there are no developed facilities, there are approximately 20 undeveloped sites. Oak Creek receives frequent use by scouts and church groups. Willow Springs was formerly a campground and still receives regular weekend/overnite use at the approximately 17 picnic sites. La Madre Spring attracts moderate use and is planned for development as a group use area. Small groups and families frequently camp along road shoulders and spur roads such as those in the portion of RRCRL south of Pahrump Highway.

Bicycling, Jogging. A bicycle trail connects the Las Vegas metropolitan area to the RRCRL. Clark County and State officials have expressed interest in expanding bicycling opportunities in the area. The Scenic Loop Road is rapidly becoming popular with joggers and has been recently used for a mini-marathon race.

Interpretation and Environmental Education. Opportunities for interpretation and environmental education are limitless in the RRCRL. They range from automobile and bus tours on the paved roads, to easy walks on fairly level terrain, to a wilderness backpacking experence of several days duration.

University classes, continuing education classes, school groups, scouts and others value Red Rocks as a living laboratory. In recent years the BLM has conducted numerous interpretative talks and environmental education programs in response to direct requests from such groups.

Off Road Vehicles (ORV). The 1974 Management Framework Plan for the Stateline Planning Unit restricts vehicle use in the RRCRL to the paved roads and a limited number of designated dirt roads. A rare public consensus exists regarding this normally controversial subject. ORV use there is commonly viewed as inappropriate. Local ORV clubs have cooperated with BLM in limiting use in the RRCRL. Formal ORV use designation is in process.

Hunting. Upland bird and big game hunting is permitted, and does occur, above 5,000 feet. To avoid conflicts in the heavier-use recreation areas, shooting is prohibited below 5,000 feet.

Recreation Opportunities - Nevada Division of State Parks Lands.

Purchased by the Nevada Division of State Parks (NDSP) in 1974, Spring Mountain Ranch State Park is a 528-acre working ranch which contains rich historical features. Use of the area, first as a camp along an alternate route of the Spanish Trail and then as a ranch dates back to the mid-1830s. Several ranch and farm buildings, corrals, a cemetery, and an irrigation reservoir still remain.

The park provides a wide variety of recreation opportunities. A family picnic area under oak trees contains 25 tables. An associated facility accommodates large groups. Adjacent playing fields offer space for overflow picnicking, softball, volleyball and other sports and games during the day.

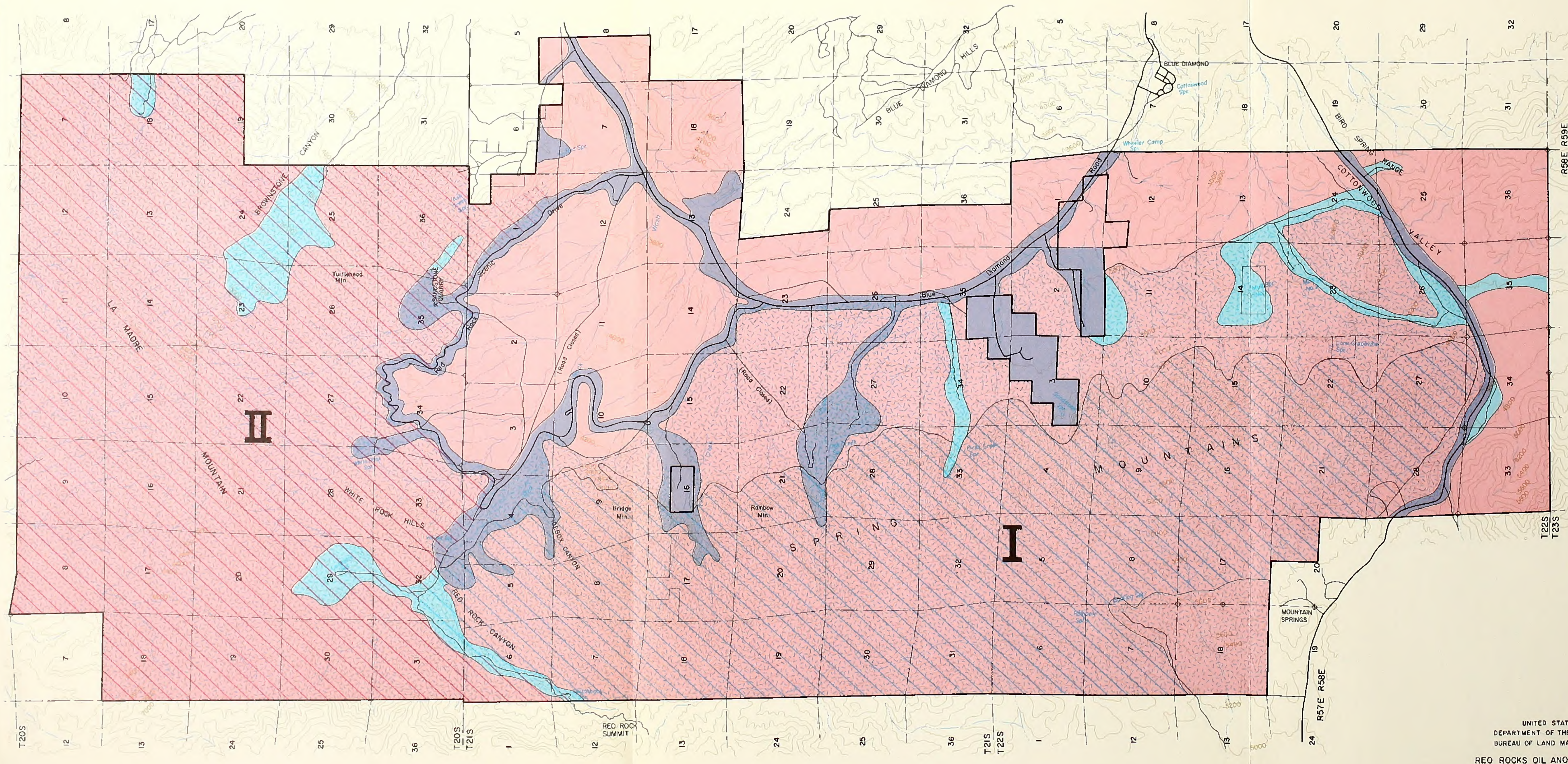
On certain evenings during the warm months a wide variety of theater, music, and dance programs are presented. The main ranch house serves as a visitor center, dispersing information on the area and on statewide recreation activities.

Self-guided and guided tours are offered at the visitor center as well as throughout the Park. Natural history and historical hikes are scheduled regularly, as are environmental education programs for local schools. Contrasting with the developed ranch area, is a detached parcel of State Parks land in Pine Creek. This 80-acre site adjacent to the Scenic Loop Road is noted for its refreshing, perennial stream shaded by ponderosa pines and containing many unusual species of plants. A developed trail provides access for sightseers, photographers, hikers, equestrians, and rock climbers. A limited amount of picnicking and environmental education also occur there.

Of particular concern to NDSP officials are the water sources in the RRCRL that provide the waters to keep the state park in its lush, green condition.

Recreation Use - Public Domain Lands.

The RRCRL are used year-round by individuals, families and groups. State of Nevada surveys within the last five years indicate that between 70 and 85% of the area's visitors are from Clark County. Information from local sightseeing companies indicates an increase in the number of out-of-state visitors. These people are primarily associated with Las Vegas conventions. An outdoor recreation study conducted by the League of Women Voters in cooperation with the BLM determined that approximately 80% of the responding local residents use area-wide recreation facilities, including Red Rock Canyon, up to 15 times a year. As a tightening energy situation limits recreational travel, use of the RRCRL by local residents will undoubtedly increase considerably.



RECREATION USE ZONES

HEAVY

MODERATE

LIGHT

WILDERNESS STUDY AREAS

I PINE CREEK "RECOMMENDED"

II LA MADRE "DESIGNATED"

INTERIM MANAGEMENT POLICY & GUIDELINES FOR LAND UNDER WILDERNESS REVIEW

MILES

KILOMETERS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT

RECREATION USE ZONES AND PRESENT WILDERNESS SITUATION

Although the RRCRL encompasses approximately 61,000 acres, the great majority of the visitors use the desert floor and canyon areas from the La Madre Mountains to the Pahrump Highway, and from the Blue Diamond Road to the Red Rock Escarpment. A 1975 State of Nevada Survey was conducted to determine types of recreation use in the recreation. The majority of people (83%) came for a short visit of four hours or less. Most of the visitors (65%) planned to sightsee or picnic. Hiking was the next most popular activity.

Recreation use data for the RRCRL is somewhat limited, though it is available for the main roads and use areas.

The "Recreation Use Zone" Map delineates use areas. The following definitions apply to the zones on the Map:

Heavy Use: On any given day of the year, there would probably be a relatively constant amount of visitor use. During busy periods such as weekends and holidays, the carrying capacity of existing recreation facilities (overlooks, picnic areas, etc.) could be exceeded. For use to be increased in these areas, generally more intensive management would be required to prevent user conflicts or negative resource impacts.

Moderate Use: On any given day, intermittent use could be expected. Use during weekends is relatively constant, and on holidays, use may be heavy (see above definition) in some of these areas. With proper management, use could normally be increased in these areas without creating resource damage or user conflicts.

Light Use: Most visitor use would likely occur only on weekends and holidays. During these periods of lighter use, visitor impacts to the resource would normally be minimal. These areas are referred to in this document as dispersed.

Recreation visitation on the Scenic Loop Road was relatively stable at approximately 145,000 visitors annually from 1973 to 1976. When the previously deadend Scenic Loop Road was lengthened into the one-way drive in 1978, visitation increased dramatically to about 233,000 persons in 1978 and to about 315,400 in 1979. Increased liesure time and the booming Clark County population were also important factors in this increased use.

Recreationists on the Blue Diamond Road within the RRCRL totaled approximately 441,000 in 1973 and some 776,000 in 1979. In 1979 approximately 570,000 recreation visitors traveled the Pahrump Highway within the RRCRL.

Table 3-8 is a compilation of 1979 recreation use figures at several of the major sites in the RRCRL.

TABLE 3-8

1979 RRCRL VISITATION AT SPECIFIC SITES

Recreation Site	Number of Visitors[a]
Brownstone Canyon	4,000
Red Springs	67,000
Calico Vista	91,000
Sandstone Quarry	75,000
Whiterock Spring	23,000
Willow Spring	127,000
LaMadre Canyon	1,000
Lost Creek Canyon	6,000
Ice Box Canyon	21,000
Pine Creek canyon	70,000
Dedication Site	48,000
Cave	142,000
Oak Creek Canyon	10,000
First Creek Canyon	2,000[b]
Spring Mountain Ranch State Park	90,000

[a]Based on 3.5 persons per vehicle (NDSP Visitor Use Survey, 1976)

[b]Closed following range fire on July 3, 1979

Recreation use in the RRCRL is affected by a number of factors. Visitation throughout the year is considerably higher on weekends. The mild climate during Spring and Fall months draws higher visitation, whereas the hot Summer months and the cold Winter months cause a moderate reduction in over-all use. Evening and night use are greater from May through September.

Recreation Use-Nevada Division of State Parks Lands

In addition to being by affected factors previously mentioned, recreation use at the Spring Mountain Ranch reflects the number of cultural and interpretive programs offered. Use is higher during Spring and Summer months because the majority of the programs are offered during this period. Evening use is higher in the hotter months as many of the programs are scheduled after dark.

Table 3-9 shows 1979 month-by-month use figures for both the Scenic Loop Road and the Spring Mountain Ranch.

Of the 89,835 visitors at the Spring Mountain Ranch in 1979, approximately 65% or 58,400 used the picnic facilities. Attendance at the "Super Summer" programs (plays, blue grass music, and dance performances) totalled 9,010. Regularly scheduled guided tours were presented to 4,209 visitors. Since May 1976, NDSP has conducted a series of environmental education in-service programs for 449 local school teachers. The teachers in turn have presented environmental education programs during that period to 7,542 students.

Special Events

In addition to the use at areas mentioned previously in the recreation use section, there are several special events and group activities conducted in the RRCRL.

- In January 1980 the first annual Red Rocks Foot Race traversed the Scenic Loop Road. The race attracted approximately 50 entrants, plus their support crews, from out of state. This event promises to become popular and more races may be planned.

- In 1978 BLM presented several talks and environmental education programs to some 200 participants. This was without benefit of a regularly scheduled announcement or visitor information center. Participation will undougtedly soar onece the Visitor Center is completed.

TABLE 3-9

1979 VISITATION ON SCENIC LOOP AND SPRING MOUNTAIN RANCH[a]

Month	No. of Visitors on Scenic Loop	No. of Visitors at Spring Mountain Ranch
January	24,900	4,543
February	26,000	6,079
March	34,000	9,772
April	34,700	11,015
May	24,500	8,428
June	23,800	10,370
July	24,600	8,207
August	23,900	6,528
September	28,800	7,480
October	25,300	7,888
November	23,100	5,670
December	21,800	3,955
Annual Totals	315,400	89,835

[a]Based on 3.5 person per vehicle (NDSP Visitor Use Survey, 1976)

-In 1978 NDSP presented five interpretive programs to 298 visitors on public lands in the RRCRL.

-The annual Red Rocks clean up attracts approximately 1,000 public volunteers, considerable local media coverage, donations from a number of private businesses, and the support of several government agencies.

-Camping groups with up to 50 members regularly utilize Oak Creek Canyon, without developed facilities.

Recreation Use-Private Lands

or discussion of commercial recreation use at the Old Nevada-Bonnie Spring Ranch, and on tour buses, refer to the Land Use Section of this chapter.

Master Plan

Interest in controlled development and use of the RRCRL has existed since the mid-1960s. The first Master Plan was prepared in 1968, and called for large scale, widespread construction of lodgings, roads and other facilities. Public dissatisfaction over this plan led directly to preparation of FES-75-92. Alternative IV in that document was selected over the proposed action, the 1968 plan. That alternative called for development below the escarpment along existing corridors only, and for little or no development above the excarpment and in Brownstone canyon. Selection of this alternative led to preparation of a new master plan which was completed in 1976.

Following is a summary of the development proposed in this plan.

Visitor Center. The focal point of the master plan is the Visitor Center, now under construction near the entrance to the Scenic Loop Road. This administrative and interpretive center will introduce visitors to the opportunities available in the RRCRL. It will provide them exhibits, literature, maps, information, and interpretive programs. The building has been sited to provide an unobstructed, panoramic view of the escarpment. Interpretive and environmental education programs for local schools, organized groups and the general public will be a major function of the center.

Completion is expected in late 1981.

Scenic Loop Road and Overlooks. A 13-mile paved scenic drive with six vehicular overlooks was constructed as stated in the master plan. Four of the six vehicular parking areas have been paved. When completed, these overlooks will include interpretative signs and trail heads.

Picnicking. The master plan recommends placement of picnic tables and associated facilities at several of the major sites throughout RRCRL: Sandstone Quarry, Willow Springs, Pine Creek and Spring Mountain Ranch. These sites will also have pit or chemical toilets. Useable terrain and ability of the resource to withstand human impact will determine the size of each development.

Hiking Trails. The trail at Calico Vista will be lenghtened into a loop of approximately 1.5 miles, encouraging exploration of the colorful sandstone outcropings.
Interpretive signs may be provided.

A longer trail at Sandstone Quarry will allow easy exploration of the wash, surrounding hills, and an archaeological site, as well as the remmants of the old quarry. A trail will be routed over the ridge into Brownstone Canyon.

Whiterock Spring will serve as a trailhead for a hike of several miles over fairly steep terrain into Brownstone Canyon. Once over the ridge, the path will connect with a jeep trail, which will have been closed to vehicular use.

Table 3-10 displays site-by-site recreation opportunities in RRCRL as delineated by the 1976 master plan.

TABLE 3-10
RECREATION OPPORTUNITIES AS OUTLINED
IN THE RRCRL MASTER PLAN a

Activity: Site	Picnicking	Camping	Hiking	Sight-seeing	Inter-prtation	Bicycling	Rock Climbing & Scrambling
Brownstone Canyon			X	X	X		
Red Springs	X		X	X			X
Visitor Center				X	X	X	
Calico Vista			X	X	X	X	X
Sandstone Quarry	X		X	X	X	X	X
White Rock Spring			X				
Willow Spring	X						X
LaMadre Spring		X	X	X			
Red Rock Summit Road		X	X	X			X
Lost Creek Canyon			X	X			X
Ice Box Canyon			X	X			X
Pine Creek Canyon	X		X	X	X		X
Red Rock Vista				X	X	X	
Cave	X		X				X
Oak Creek Canyon	X	X	X	X	X		X
First Creek Canyon			X	X	X		
Spring Mountain Ranch	X		X	X	X	X	

a Activities not related to specific locations, such as hunting, horseback riding, etc, are also available opportunities

CULTURAL RESOURCE

General

The archaeology within the RRCRL is relatively well known, although not completely understood. Earlier surveys in the RRCRL (Shutler and Shutler, 1962) identify roasting pits in association with rockshelters and open campsites as well as a wide distribution of rock art (petroglyph and pictograph) sites. The "Cultural Resource Sites and Archaeological Sensitivity Map shows the location of the various cultural resource sites. The Shutlers found evidence of extensive use of the RRCRL area by earlier Puebloan groups and later by Southern Paiute peoples. Their analysis of the pottery types associated with these sites suggests trade with the Lower Colorado River groups.

Data Available

Throughout the last decade, both Systematic and Reconnaissance surveys have been conducted, primarily by the University of Nevada, Las Vegas, for the BLM's cultural resource inventory.

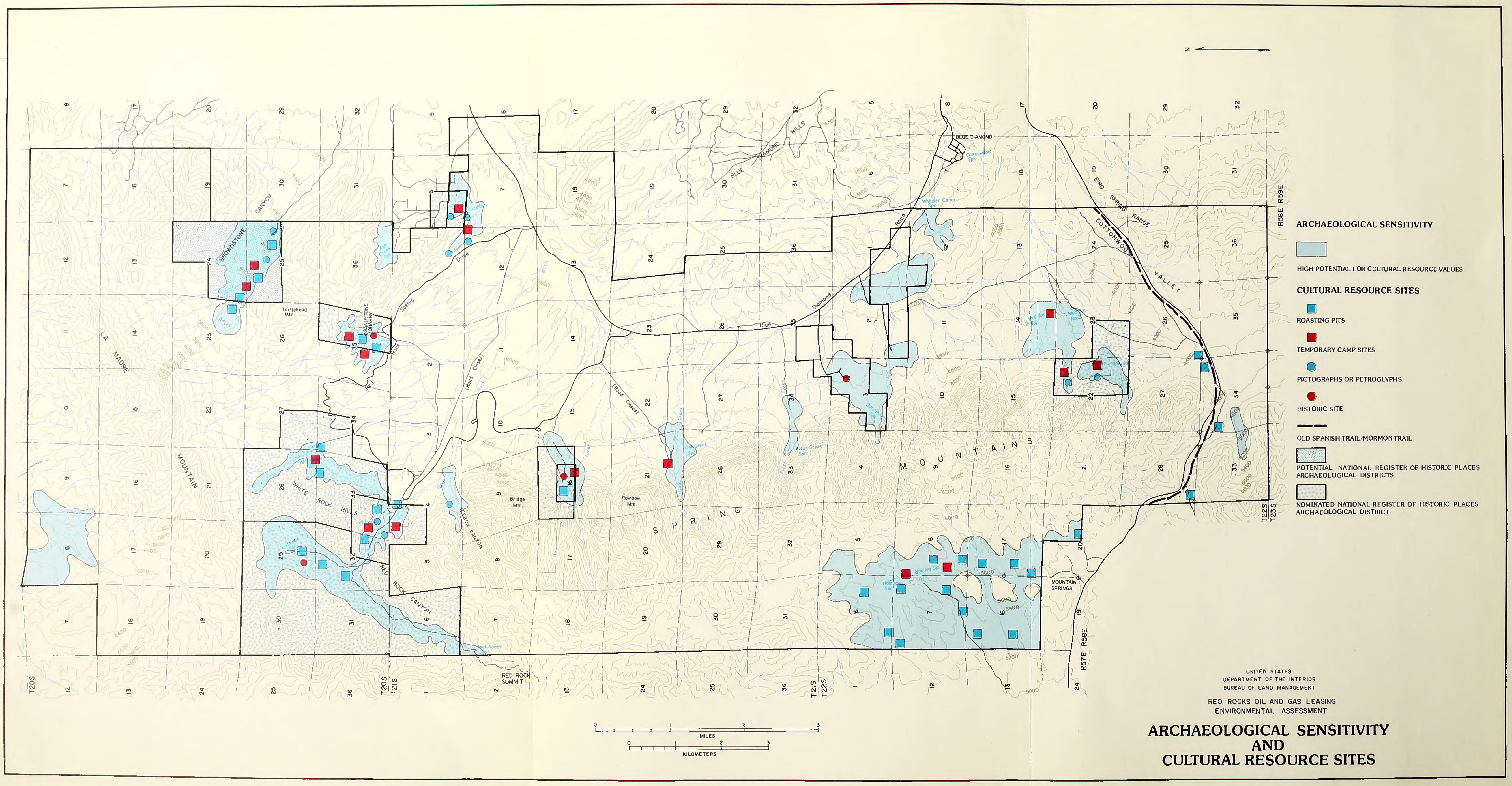
BLM Class II (Systematic) cultural resources surveys were conducted in 1977 and 1978. These surveys covered in the northern end of the Red Rocks, especially Brownstone Canyon, Sandstone Quarry, Lost Creek, Willow Spring, Calico Springs and Ice Box Canyon. The "Cultural Resources Inventory" map shows, based on those surveys, where additional cultúral resourse sites are likely to occur in RRCRL.

Pre-History

Willow Spring and Brownstone Canyon represent the most significant archaeological values in the northern portion of the RRCRL. Long-term prehistoric use of the two areas is indicated by significant numbers of open campsites, rock shelters, roasting pits, petroglyphs, and pictographs.

During the surveys, over 300 archaeological sites have been recorded, including rock circles, lithic scatters, open camp sites, rock shelters, petroglyph and pictograph panels, numberous roasting pits, and historic roads and associated materials.

Analysis of pottery types within the RRCRL indicates occupation by or trade with the Puebloan peoples of the Muddy-Virgin River region as well as Southern Paiute and Lower Colorado river groups. Extensive exploitation of agave and roasting of other foods (including the desert tortoise) is evidenced by the many roasting pits thoughout the RRCRL. The concentration of sites alone is indicative of long occupation and/or intensive seasonal exploitation of the RRCRL by these aboriginal groups. Portable and bed rock mortars (bowl-shaped rocks in which grains and


ARCHAEOLOGICAL SENSITIVITY
HIGH POTENTIAL FOR CULTURAL RESOURCE VALUES
CULTURAL RESOURCE SITES
ROASTING PITS
TEMPORARY CAMP SITES
PICTOGRAPHS OR PETROGLYPHS
HISTORIC SITE
OLD SPANISH TRAIL/MORMON TRAIL
POTENTIAL NATIONAL REGISTER OF HISTORIC PLACES ARCHAEOLOGICAL DISTRICTS
NOMINATED NATIONAL REGISTER OF HISTORIC PLACES ARCHAEOLOGICAL DISTRICT
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
REO ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT
ARCHAEOLOGICAL SENSITIVITY
AND
CULTURAL RESOURCE SITES
MILES
KILOMETERS
N
BLUE DIAMOND
BLUE DIAMOND HILLS
BROWNSTONE CANYON
LA MADRE MOUNTAIN
WHITE ROCK HILLS
RED ROCK CANYON
ICEBOX CANYON
SPRING MOUNTAINS
BIRD SPRING RANGE
COTTONWOOD VALLEY
MOUNTAIN SPRINGS
RED ROCK SUMMIT
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
SANDSTONE QUARRY
Scenic Drive
Blue Diamond Road
R58E R59E
R57E R58E
T20S T21S
T21S T22S
T22S T23S

seeds were pulverized for use as foods) have been observed, and suggest probable use of the acorns of the scrub oak prevalent along the numerous canyons, side canyons and slopes throughout the sandstone bluffs section of the RRCRL.

During surveys of the Red Rock escarpment in 1976 and 1977, numerous sites were located. The sites were concentrated in the vicinity of springs, and along flat-topped ridges or benches adjacent to washes which are near springs or ephemeral creeks. The distribution of sites reflects several factors, particularly availability of water and the degree of pitch of the terrain (Crabtree et al, 1970, 1974). Seasonal use of the RRCRL is indicated by the large number of roasting pits and the availability of pinyon, oak and juniper as well as deer, rodents and bighorn sheep.

There is little known about the archeological values in the south and eastern portions of the RRCRL area. Significant sites are known to exist in the vicinity of Mountain Springs, Lone Grapevine Spring, and Scrub Oak Spring. The Mountain Springs site has complex features. There are several large roating pits that are ideally suited for interpretation and protection. The site is easily accessible from the existing highway. An intensive investigation of two specific sites in the area of Lone Grapevine Springs within the RRCRL demonstrates the possibility of an early intrusion of Shoshonean speaking peoples to hunt deer and bighorn sheep in the southern spring Mountains. This is reflected in distinctive rock art, ceramics, lithics and drilling equipment in the shelter cave. Probable ancestors to the Southern Paiute, these people may have adopted to new patterns of exploitation, possibly through continued contact with the Virgin River Branch Anasazi to the east (Cunningham, 1978).

Major occupation sites have been recorded at Pine Creek and Willow Springs (Rocky Gap). These sites contain six varieties of pottery shards, various lithics, milling equipment. eight roasting pits, historic artifacts, and rock aligned walls (Brooks, et al, 1977:8). "Darkened organic areas indicate that subsurface material may be located." (Brooks, et al, 1977:10). The Las Vegas District has recently completed an archaeological interpretive foot trail at Willow Springs including interpretive signs which describe cultural values in the area.

Illegal collection and vandalism activities are serious problems at many of the archaeological sites within the region. The sites within the Red Rocks have experienced moderate to high levels of damage. The Willow Springs, Red Springs, Brownstone Canyon and Sandstone Quarry sites have sustained much of the vandalism and disturbance in the RRCRL, since they are next to well-traveled roads.

History

At the time the first people of Europeon descent visited the area, it was inhabited by Southern Paiute Indians. Commercial travel on the Old Spanish Trail began in 1829-1830 with a caravan led by Antonio Armijo.

John C. Fremont passed along the trail during his return from California in 1844. He wrote that he hurried his trip through Nevada because of unfriendly Indians. Both Mountain Springs and Blue Diamond (west and east of the RRCRL, respectively) served as watering spots for users of the trail. During this period, Blue Diamond was known as Cottonwood Springs and Mountain Springs was sometimes known as Paiute Springs. The trail users left little evidence of their passing.

By the mid-1830s a camp site near Blue Diamond along the creek that flowed through Cottonwood Valley was regularly used. California - and New Mexico-bound travelers rested at this desert oasis. Pack trains used the Old Spanish Trail exclusively until 1848. By this time it was called the Morman Trail, reflecting changes in the backgrounds and origins of the trail users. This route continued to have some importance until it was finally replaced by the San Pedro, Los Angeles and Salt Lake Railroad in 1905.

The first settlement of the white man in the Red Rocks was at Sandstone Ranch (now Spring Mountain Ranch), established by James Wilson in 1867. The ranch has changed hands and names numerous times since then. It has been called the Bar-Nothing Ranch, the Krupp Ranch when it was owned by Countess Vera Krupp, and the Spring Mountain Ranch when owned by Howard Hughes. Its last private owner was Las Vegas automobile dealer Fletcher Jones,who sold it to the NDSP.

Another settler in the area was Horace Wilson, who established his residence in Pine Creek Canyon in 1922. NDSP acquired this ranch in 1974.

There were also mining activities in the RRCRL. The RRCRL were included in the Timber Mountain Mining District, some 30 miles square. Ore was discovered in October, 1869. Fifteen different locations were filed between that date and 1881. However, little ore, mostly low grade galena was removed over the 12 year period.

Large sandstone blocks were quarried during the early 1900s at the location presently known as Sandstone Quarry. The blocks were used in the construction of early Las Vegas buildings.

National Register of Historic Places

Several different areas within the RRCRL have been or are under consideration for nomination to the National Register of Historic Places. The 1976 Cultural Resources Inventory of portions of the RRCRL identified an area including La Madre Canyon, Willow Spring, White Rock Springs, Sandstone Quarry, and Red Spring as potential nominations to the National Register of Historic Places. During the 1977 Cultural Resources Inventory of the RRCRL, 25 sites were recorded and further evaluated as an archaeological site district. Brownstone Canyon has been nominated to the national register. Table 3-11 lists the locations of the potential or nominated districts.

TABLE 3-11

POTENTIAL OR NOMINATED ARCHAEOLOGICAL DISTRICTS
FOR INCLUSION TO THE NATIONAL REGISTER OF HISTORIC PLACES

Potential:

La Madre Canyon

T.20S., R.58E., Sections 29 all, 30 all, 31 all, 32 NE¼, NW¼, SW¼.
T.21S., R.58E., Section 6 all.

Lone Grapevine Spring

T.22S., R.58E., Section 22, NE¼, SE¼;
Section 23, SW¼.

Pine Creek Canyon

T.21S., R.58E., Section 16, NE¼, NW¼.

Red Springs

T.21S., R.59E., Section 6, SW¼.

Sandstone Quarry

T.20S., R.58E., Section 35, NE¼, SE¼.

White Rock Springs

T.20S., R.58E., Section 27, SW¼; Section 28, all;
Section 33, NW¼, NE¼, SE¼;
Section 34, NW¼.

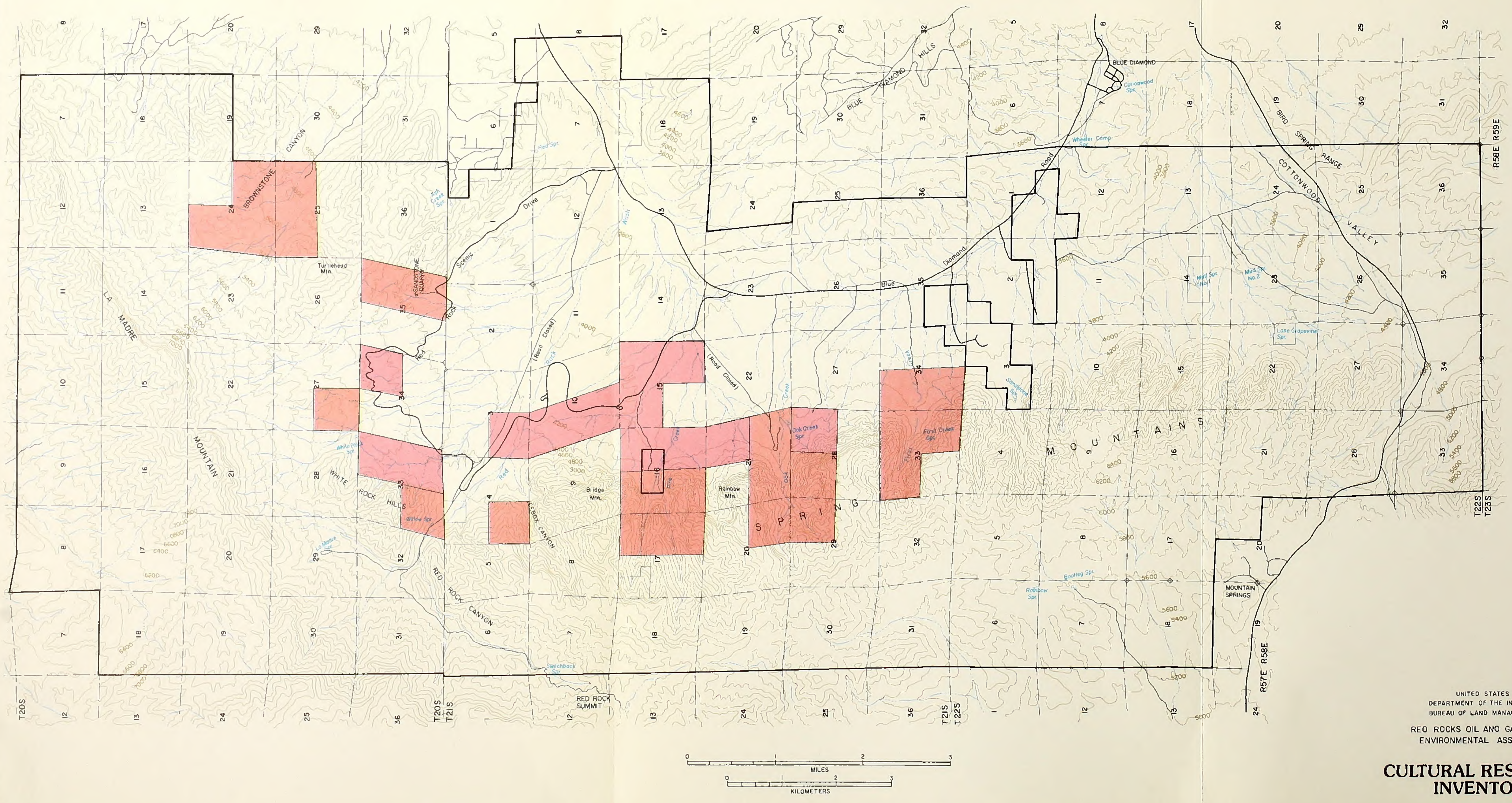
Willow Springs

T.20S., R.58E., Section 32, SE¼; Section 33, SW¼.
T.21S., R.58E., Section 4, NW¼.

Nominated:

Brownstone Canyon

T.20S., R.58E., Section 24, NW¼, SW¼, and SE¼.
Section 25, NW¼, NE¼.



FY 76 CLASS 2 CULTURAL RESOURCES SURVEY SAMPLE UNITS

FY 77 CLASS 2 CULTURAL RESOURCES SURVEY SAMPLE UNITS

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT

CULTURAL RESOURCES INVENTORY

SOCIO-ECONOMIC

Economic

Economic activity within the RRCRL is limited to the Old Nevada-Bonnie Spring Ranch development (see Land Use).

Las Vegas, 15 miles east of the RRCRL, is the center of economic activity in Nevada. The resort industry is the largest element in the economy, accounting directly and indirectly for about 2/3 of the total employment (McDonald and Grefe, 1977). This heavy reliance on one industry could make the Las Vegas economy vulnerable to recessions in the future if there are significant decreases in the demand for Las Vegas gaming due to changes in tastes and preferences, competition from other resort areas, and increases in the cost of transportation. None of these has significantly impacted Las Vegas in the past. Gaming revenues have increased steadily over the last three or four decades. As a result, Las Vegas has been one of the most rapidly growing urban areas in the nation. The estimated 1979 population of 430,000 (UNLV, 1979) was 58% greater than the 1970 level of 273,000. This is significant when compared to the estimated national population growth of 7.6% during the same period. Barring any significant change in the demand for gaming, the population of Las Vegas is expected to continue its rapid growth. The 1990 population projection is 600,000 (UNLV,1979). The RRCRL contributes to the attractions drawing tourists to Las Vegas. Tour buses visit the area several times a week. A recent visitor study indicated that 8 percent were fully or partially motivated to visit Las Vegas by sightseeing (Las Vegas Convention and Visitors Authority, 1976). However, visits to the RRCRL account for less than 5% of visits to recreation areas near Las Vegas.

Mining accounts for about 300 jobs in the Las Vegas area, less than 1% of total employment. Most of the mining activity is associated with gypsum and lime production. No oil or gas is being produced, but from September 1979 to May, 1980 oil well was drilled on Mormon Mesa. A full time crew of about 20 was employed at the site. Additional part time temporary employment of up to 100 persons was required at times during the operation. Most of these employees are crews based in other states.

By late 1979 there were 944,640 acres of public lands in Clark County under lease for oil and gas exploration. Half of the annual lease fee of $1 per acre is allocated to the U. S. Treasury, the other half goes to the State of Nevada which allocates it to the counties for educational purposes. The county charges an <u>ad valorem</u> tax based on an assessed value of $2.00 per acre for non producing oil and gas leases. If production occurs the per acre tax will be dropped and the county will base its tax on the net proceeds of the wells. The current tax rate is $2.25 per $100.00.

At this rate the net proceeds of the mines tax produced about $100,000 of revenue for the county, less than one percent of the total property tax revenue.

Part of the impetus behind the proposal has been the need for additional sources of domestic oil production. On a national level, total domestic crude oil production averages about 8.5 million barrels per day, down from 9.2 million in 1973. Crude oil daily imports averaged about 6.3 million barrels in 1979 compared with 3.2 million in 1973 (Monthly Energy Review, April 1979.) Increases in the per-barrel price of the oil has risen dramatically. On April 1, 1980, the world price of oil (average price without charges for delivery to and loading onboard ship, weighted by export volume) was $29.61 per barrel. A year earlier the price was $16.22. On January 1, 1979 the price was $13.77. (Weekly Petroleum Status Report, April 25, 1980.) This heavy reliance on imported oil (41% of domestic use) has contributed significantly to balance of payments deficits, devaluation of the dollar, and inflation.

Social Values

Las Vegas is a racially mixed community with racial percentage distributions close to the national distributions. The population is younger than the national average with a much higher proportion in the prime working ages of 20 to 24. The per capita income of $7,735 is well above the national level of $7,026 (U.S. Bureau of Economic Analysis, 1979). Las Vegas has a highly mobile population with in- and out-migration rates much higher than the national average. One recent study (UNLV, 1975) stated that persons migrate to Las Vegas in search of opportunity as indicated by a high net migration to Las Vegas of 20 to 24 year olds, many of whom are starting careers.

A survey of community opinion leaders (Eyrins, 1976) found that values considered important were education, the family, honesty and trust, economic development, and neighborliness. Values considered less important were personal status and environmental concerns. Most of the respondents would have preferred both accelerated economic development and a clean environment, but when required to establish priorities they chose economic development. This survey was associated with power plant construction. No specific mention of the RRCRL was made.

While community leaders favor economic development, in general many residents feel very strongly about specific protection of the RRCRL. Responses to this environmental assessment while in draft form included telephone calls, letters, and petitions. They totaled 297 in favor of oil and gas leasing and 2,222 opposed. Typical opinions expressed by those in favor of leasing were:

"I fail to see how oil development can spoil an area which is already marred."

"Because of the growing dependence on foreign oil America needs this domestic production."

"Surface disturbance can be healed in a short period of time and pumping equipment can be camouflaged for those that feel it is unsightly."

Typical opinions expressed by those against leasing were:

". . . the value of the Red Rock area's scenic attraction far outweighs its value as a potential oil source."

"The overthrust belt runs many miles, and surely there are other places besides Red Rock that could be drilled."

"The population of Las Vegas will probably double by the year 2000. There will be even more of a need to get out of the 'big city' atmosphere and back to nature."

"It affords the residents of Las Vegas a place to enjoy scenic beauty and recreation only minutes from any part of the Las Vegas Valley."

"Recreation areas such as this are in short enough supply as it is."

WILDERNESS

Twenty three per cent of the RRCRL, 14,350 acres, has been released from wilderness consideration and the remaining 77% is currently under wilderness review. The "Recreation Use Zones and present Wilderness Situation" Map displays existing and proposed wilderness study areas in RRCRL.

The portion of the RRCRL north of the Scenic Loop Road and the Red Rock Summit Road is part of the La Madre Mountain Wilderness Study Area (WSA) which was designated as a result of the Overthrust Belt Accelerated Inventory. This unit, NV-050-0412, was found to appear natural and unaffected by man's activities, and to offer outstanding opportunities for solitude and primitive recreation, based on extensive public support. Approximately 20,100 acres of the RRCRL is included in this WSA.

Most of the southern and western portions of the RRCRL, approximately 26,400 acres, are contained in inventory Unit NV-050-0414, Pine Creek. This unit includes the Red Rock escarpment, the Pine Creek Natural Area; and a large part of the scenic attractions characterizing the Red Rocks area. A preliminary recommendation has been made by the Las Vegas District that much of the Pine Creek Inventory Unit be designated a WSA, based on its naturalness, outstanding opportunities for both solitude and primitive recreation, and its numerous geological, botanical, and archaeological supplemental values. This proposal is currently undergoing public comment as part of the Statewide Intensive Inventory. A decision on the unit's release or designation as a WSA will be made by the BLM State Director in September, 1980.

Both the La Madre Mountain WSA and Inventory Unit NV-050-0414 are currently managed according to the restrictions outlined in the Interim Management Policy and Guidelines for Lands Under Wilderness Review. These guidelines apply only to the 46,500 acres of the RRCRL which are still under review.

LAND USE

Land Status

The RRCRL comprise an area of 63,110 acres. The following table provides a breakdown of land ownership within the designation boundaries of RRCRL.

Public surface and mineral estates	60,850 acres
Private surface and mineral estates	2,200 "
[a] Private surface but public mineral estate	60 "
Total	63,110 "

All of the public lands comprising the RRCRL , with the exception of a 120-acre parcel, have been classified for multiple use management under the Classification and Multiple Use Act of 1964 (C&MU). This classification, which became effective November 10, 1966, segregated these lands from appropriation under the homestead, desert entry and allotment laws, from sale under Revised Statute 2455 and the Public Land Sale Act of September 19, 1964, and from operation of the general mining laws. The excepted 120-acre parcel situated in the E1/2SE1/4 of Section 29 and the NE1/4NE1/4 of Section 32, T20S, R58E was reconveyed to the United States in 1973 and, therefore, was excluded from the multiple use classification. This parcel is open to the operation of the public land laws.

In addition to the multiple use classification above, other use restrictions have been established on certain public lands in the RRCRL. Public Land Order (PLO) 3530 established the Pine Creek Research Natural Area (N1/2NE1/4, NW1/4NW1/4, N1/2SW1/4NW1/4 and the NW1/4SE1/4NW1/4 of Section 17, T21S, R58E), withdrawing these lands from all forms of approporiation under the public land laws, including the general mining laws, but not from leasing under the mineral leasing laws. This designation was made to protect unique botanical, geological and zoological characteristics there and irreplaceable scientific and recreation values. Executive Order (EO) of February 23, 1916 created Public Water Reserve #33 encompassing the S1/2SW1/4 of Section 6, T21S, R59E. Secretarial Order (SO) 127 created Public Water Reserve #107

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[a] This is commonly referred to as a "split estate". Although the surface estate is in private ownership, the mineral estate is administered by BLM.

affecting lot 4 of Section 4, T21S, R58E; Lot 8, the NE1/4SW1/4 of Section 14, and the NE1/4SE1/4 of Section 22 in T22S, R58E. These Public Water Reserves are not segregated from operation of the mineral leasing laws.

On October 5, 1967, the secretary of the Interior formally designated the Red Rock Canyon Recreation Lands under designation N-6005 (formerly N-257 A).

Research of the Clark County Courthouse records reveals that approximately 30 mining claims have been located on public lands in the RRCRL and recorded.

One land use application is presently pending on public lands in the RRCRL. The NDSP filed Recreation and Public Purposes (R&PP) Application N-7293 on December 22, 1972 for acquisition of approximately 2,040 acres to establish the State Red Rock Canyon Recreation Area.

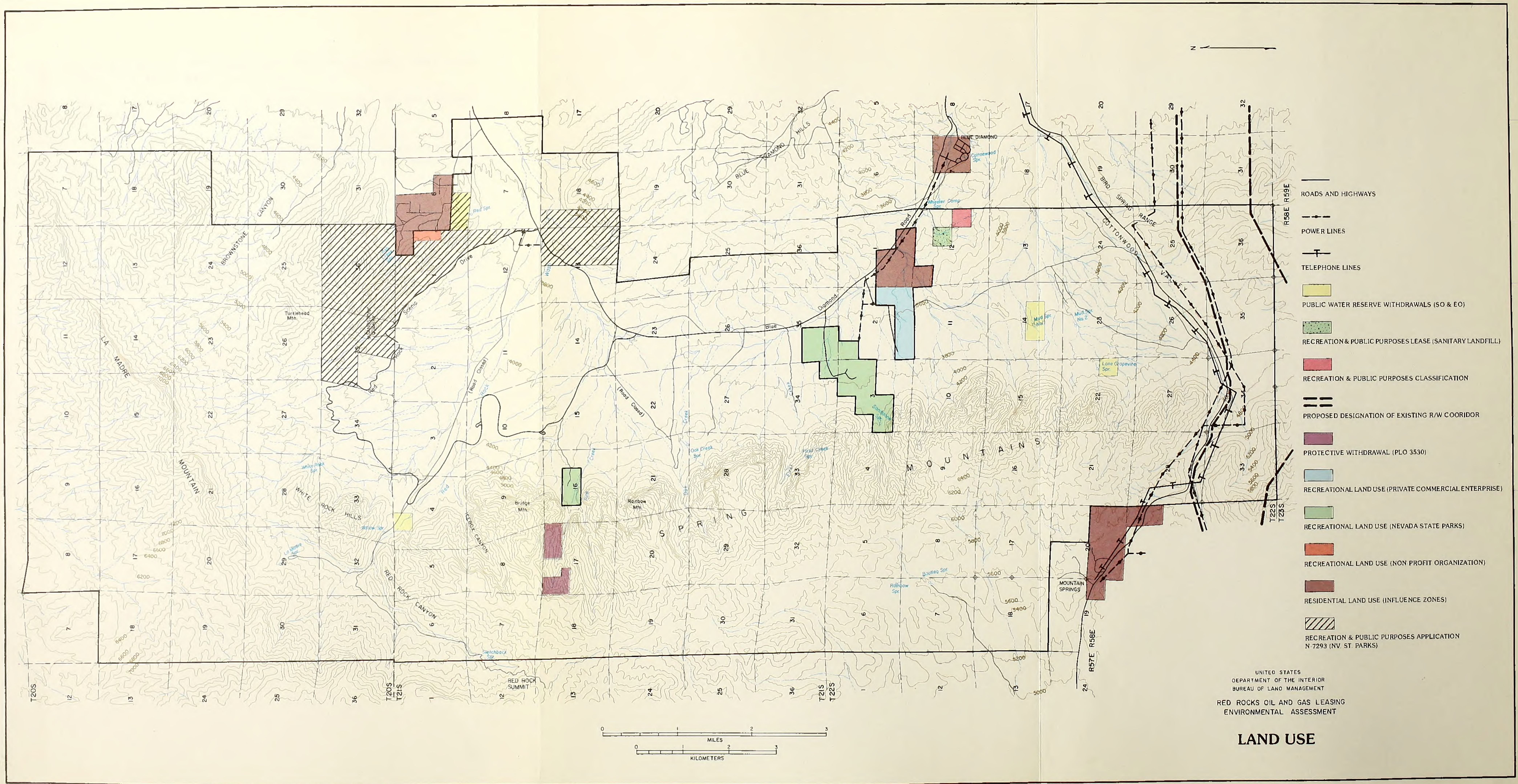
Land Use

Several rights-of-way have been granted across the public lands in the RRCRL for roads, power lines, telephone lines, and underground cables. The designation of an existing right-of-way corridor pursuant to Section 503 of the Federal Land Policy and Management Act of 1976 is currently proposed in the southern end of the RRCRL. The proposed corridor would include those public lands in an area one-mile in width, south from the centerline of the existing Department of Energy 750 Kilo-volt transmission line right-of-way (Nev 065524). A detailed description of the proposed right-of-way corridor is contained in Appendix(I).

A 40-acre sanitary landfill has been established under a R&PP Lease from BLM to serve the residents of Blue Diamond. The landfill is situated in the SW1/4NE1/4 of Section 12, T22S, R58E. An adjacent 40-acre parcel was also classified for R&PP use but no lease has, as yet, been granted on this land.

Private land within the RRCRL supports a variety of recreational uses. Bonnie Spring Ranch and Old Nevada are private commercial establishments providing such recreational opportunities as a model old-west town, picnic areas, horseback riding, a zoo, restaurant and bar. Future developments proposed for Bonnie Spring Ranch include a recreational vehicle park, swimming pool, and trout fishing areas. Approximately 200,000 people visit Bonnie Spring Ranch and Old Nevada annually.

NDSP operates a public recreational facility at Spring Mountain Ranch and owns an 80-acre tract Pine Creek. The agency operates a visitor center at this location and offers guided tours of the ranch as well as other interpretive and cultural programs.


ROADS AND HIGHWAYS
POWER LINES
TELEPHONE LINES
PUBLIC WATER RESERVE WITHDRAWALS (SO & EO)
RECREATION & PUBLIC PURPOSES LEASE (SANITARY LANDFILL)
RECREATION & PUBLIC PURPOSES CLASSIFICATION
PROPOSED DESIGNATION OF EXISTING R/W COORIDOR
PROTECTIVE WITHDRAWAL (PLO 3530)
RECREATIONAL LAND USE (PRIVATE COMMERCIAL ENTERPRISE)
RECREATIONAL LAND USE (NEVADA STATE PARKS)
RECREATIONAL LAND USE (NON PROFIT ORGANIZATION)
RESIDENTIAL LAND USE (INFLUENCE ZONES)
RECREATION & PUBLIC PURPOSES APPLICATION N-7293 (NV. ST. PARKS)
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT
LAND USE
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SPRING MOUNTAINS
BLUE DIAMOND HILLS
BIRD SPRING RANGE
COTTONWOOD VALLEY
BLUE DIAMOND
MOUNTAIN SPRINGS
RED ROCK SUMMIT
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
T20S
T21S
T22S
T23S
R57E
R58E
R59E

The Frontier Girl Scout Council operates a 30-acre campground immediately west of the Calico Basin Area.

Oliver Ranch, a 240-acre parcel of private land east of Old Nevada, supports a residential homesite.

Commercial use of the RRCRL for national and international television advertisements and shows, feature length movies, and local media programs is common. Approximately five temporary use permits are issued each year by BLM for these purposes.

Three communities--Mountain Springs, Calico Basin, and Blue Diamond--adjoin the RRCRL. Due to their proximity to Red Rock, these areas may be influenced by the decision regarding oil and gas leasing in Red Rock.

Pursuant to a decision in the Stateline Planning Unit Management Framework Plan, no livestock grazing is currently authorized on public lands within RRCRL.

RESOURCE INTERRELATIONSHIPS

With regard to the proposed action, the different resources of the RRCRL are ironically intertwined. As individual parts of a system, the different elements--geology, vegetation, wildlife--are not particularly unusual, certainly not unique. It is the combination of these elements into the whole that is Red Rocks--and most important, the perception of unusual aesthetic values by virtually all persons who see it--that gives the RRCRL its very high recreational values. These recreational values are highest in the area dominated by the east face of the escarpment. Indeed, the canyon floor, the escarpment, the Scenic Loop Road, the Spring Mountain Ranch State Park, Pine Creek Canyon and the other canyons slicing into the escarpment, are what most Las Vegans are speaking of when they refer to "Red Rocks."

The irony comes in that the key element of this aesthetic whole--the majestic escarpment with its alternating color bands of red and buff--is one of the few visible, classic, portrayals of the overthrusting and block faulting upon which the theory of an oil-rich Overthrust Belt rests.

Many ecological elements in the RRCRL are closely interdependent. The desert wash vegetative communities, such as that in the lower Pine Creek Wash which plays host to unique species, depend heavily on the hospitable, sandy soil, which has built up in the wash as a result of sandstone erosion from the escarpment. These same wash communities are also dependent on the high water table resulting from the copious amounts of water flowing out of the escarpment canyons. However, without the steep-walled, narrow files, waters there would be much more susceptible to evaporative loss, resulting in less water for the downstream vegetative communities.

These desert wash communities and the true riparian habitats, because of the relatively abundant and diverse vegetation, are able to support larger and more diverse populations of wildlife. These same characteristics which promote this natural abundance also promote the intensive recreational use of the RRCRL by Southern Nevadans and other visitors. The RRCRL offers a truly different and regenerative environment for Las Vegans who cope with urban stress in the desert of the valley floor. Spring Mountain Ranch State Park has proven especially valuable in providing a pleasant, natural setting for important recreational events such as theater, songfests, field days, etc.

The capstone of the resource interrelationship is the human perception, today, that the parts of Red Rocks add up to a unique geographical setting; that the "whole"--to abuse a theorem of geometry--is somehow more than "equal to the sum of its parts;" that this "whole" offers uniquely valuable recreational opportunities, and that the keystone of this ediface is actually one of mother nature's catch-22s.

CHAPTER 4

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

PROPOSED ACTION

GENERAL

To discuss the impacts of the proposed action, oil and gas operations are viewed according to the sequence of operations shown in Figure 1-2: Preliminary Investigation, Exploration, Development, Production, and Abandonment. During the impact analysis, more than one phase may be considered at the same time.

At the end of the narrative analysis, identified impacts are displayed on a quarter-section by quarter-section matrix. The same matrix is used in Chapter 5 to show how impacts can be mitigated.

NON-LIVING COMPONENTS

AIR QUALITY

Present levels of carbon monoxide, nitrogen oxides and hydrocarbons are low in the RRCRL. The additional amounts of these pollutants from vehicles and equipment in the preliminary investigation, exploration, development, and abandonment stages of this project is not expected to cause any significant change in ambient air quality. Likewise, for these four stages of the project, ozone levels should not be significantly increased over present levels.

Suspended particulates in the form of wind blown dust may be significantly increased by oil and gas exploration in the RRCRL. During the preliminary investigation, road construction, offroad vehicle travel, and surface disturbances related to gathering seismic data will all contribute to high concentrations of dust in localized areas.

During the exploration and development stage it is estimated that 35 drill pads may be constructed with five acres disturbed for each pad. A memo from the Clark County Health District dated November 28, 1979 states: "We have determined that during construction, one ton of dust is released into the atmosphere every month for every acre on which activity takes place." The memo also states that "In addition, we have observed that a significant component of construction dust contains particles that are both inhalable and are in the size range effective in reducing visibility." Each well site in its most active stage of construction would be expected to cause less than .2 tons per day of suspended particulates. This is insignificant compared to an average of 96 tons per day of suspended particulates from other sources in the Las Vegas Valley (Las Vegas Valley Air Quality Implementation Plan, 1978).

During the production phase, carbon monoxide, hydrocarbons, nitrogen oxides, sulfur dioxide, and hydrogen sulfide may be produced during routine operations. Accidents such as fire, blowouts, oil spills and leaks can also present serious air pollution problems. Hydrogen sulfide is a common by-product of gas operations. The hydrogen sulfide must be separated out and burned. This could present a source of air pollution and odor. Hydrocarbon pollution can have long range effects. According to a phone communication with the Clark County Air Pollution Control District, if more than 12 pounds per hour of hydrocarbons are produced, off-setting measures would be required. Other than for hydrocarbons, the proposed action should effect primarily the ambient air quality in the area immediately surrounding any activity.

During the production and abandonment stages the main source of suspended particulates would be vehicle travel on unpaved roads. Unpaved roads with no gravel generate approximately 11 pounds of dust per vehicle-mile traveled. Gravel roads generate about five pounds of dust per vehicle-mile. The total number of vehicle-miles can not be estimated at this time as it would vary with the degree of development.

The Clark County Air Quality Implementation Plan makes the following statement regarding dust: "While total suspended particulates may cause harmful effects on human health, there is very ltttle information available regarding the effect of soil-related dust versus industrial particulates. It is possible that the type of particulate matter found in the Southwest is not harmful to one's health at levels exceeding the primary National Ambient Air Qualtiy Standards. . . It is probable that fine particles in an urban atmosphere, because of the presence of the industrial and combustion products, may cause more adverse effects than dust which is produced from rural natural mineral soils."

Air quality in the RRCRL is regulated by the Clark County Health District Air Pollution Control Division the Clark County Board of Health under Air Pollution Control Regulations as revised July 5, 1979. Decisions made by the health district will influence the impacts of the proposed action on the air quality of the Red Rock Canyon Recreation Lands. These decisions could affect operating procedures and may require off-setting of air pollution in other parts of the Valley.

Conclusions

The amount of air pollution caused by the proposed action should be insignificant compared to other sources of pollution in the Las Vegas Valley. The effects on air quality should involve only the immediate area surrounding any activity except in the case of hydrocarbons.

TOPOGRAPHY

Preliminary Investigation

Most areas with slopes of 25% or less are easily accessible for seismic work without constructing roads or trails. To accomplish seismic work with vehicles in areas with slopes greater than 25%, however, could require use of a road or trail, necessiting construction of some new roads. As much as 160 acres could have altered topography under that situation.

Exploration, development and Production

Data obtained from Mobil Oil Company's Mormon Mesa well indicates that the drill site, including support facilities, occupied 2.76 acres, an area roughly 300 feet by 400 feet. Using the 300 by 400 foot figure as an average area required for a level pad to support drilling operations, the area that could be required for a well site in three slope classes up to the maximum slope of 25%percent was calculated, figure 5-1. The figures shown are minimums and may increase in unstable soils requiring cut and fill slopes to be laid back at a shallower angle than shown.

The amount of material moved to create a level, or multilevel pad site is directly proportional to the slope of the site. The greater the slope, the more excavation required and the greater the impact. The concrete drill pad must be set on a solid foundation and not on fill. The cutbanks and fill become much higher, therefore, in steeper slopes.

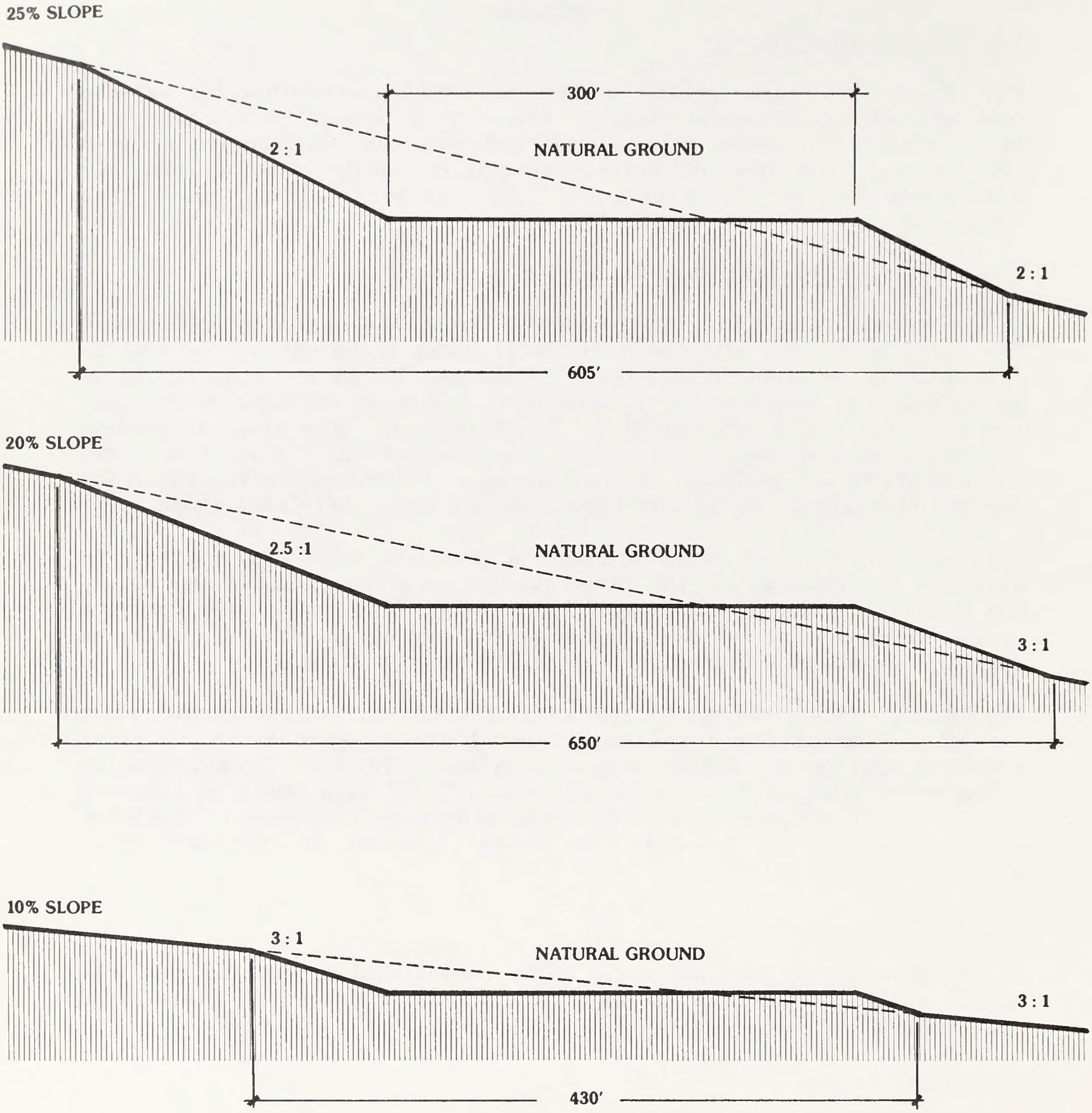
Should the RRCRL become a producing field, well sites could occur throughout the area and the magnitude of the impacts would not vary. However, they would become more extensive. Tramroads could require topographic alteration of up to 220 acres; drill pads would be leveled; pipelines and tankfarms could be built requiring thousands of yards of rock and soil to be moved in the steeper portions of the lease study area.

Abandonment

During abandonment contours could be re-established by cutting out fill slopes and redistributing the material in cuts developed in roadways or drill sites.

Conclusion

More than 600 acres of RRCRL could experience radical alteration of topography to accomodate oil and gas operations. The actual acreage affected, and the scope of the change, is a factor of the level of operations and the percentage of slope on which they occur. As the slope approaches and exceeds 25%, the degree of impact increases greatly.



Well site operating area used was 300′ x 400′ (2.76 acres) as determined by Mobil Oil well on Mormon Mesa, Clark County, Nevada.

SLOPE	DISTURBED AREA	ACREAGE
0%	300′ x 400′	2.76
10%	430′ x 400′	3.94
20%	650′ x 400′	5.96
25%	605′ x 400′	5.56

(Disturbed area calculations are minimums and did not consider balancing cuts and fills)

Figure 4-1. Calculation of area required for well site depending on slope of classification.

General

Areas mapped as critical vegetation exist, in large part, as a result of a high water table which provides plants with more moisture than is available through precipitation. Any surface disturbance in these areas could alter the sub-surface drainage. This could result in the destruction of the conditions which allow these areas of critical vegetation to exist.

Preliminary Investigation

Depending on soil type, this phase of an oil and gas operations could cause compaction of the soil as a result of occasional off-road vehicle use and the use of ground vibrating equipment. Exploding small charges or primer cord could churn the soil. Compacted soil could impede root penetration, seedling emergence, and infiltration of water. The latter would result in an increase in surface runoff. The extent of compaction could vary from very little to substantial, depending on soil types. Churned soil would be more susceptible to erosion by wind or water because soil structure, which helps to keep soil in place, would be destroyed. These exploration activities could impact approximately 160 acres in the study area. (See Table 3-1.)

Exploration and Development

During these phases, drill pads, mud circulation pits and tram roads would be constructed. If oil and gas were discovered in RRCRL, 35 drill pads and 44 miles of tramroads would be required to develop the field. The soil material that is not removed from tram roads and drill pads would be mixed with aggregate and compacted to maximum density to provide a strong bearing surface support heavy equipment. Some 400 acres could be compacted to accomodate the drill pads, mud circulation pits, and tram roads.

Production

During the production phase, pipelines, powerlines, and oil tank farms may be required. It was not possible to quantify the disturbance this may cause because data is unavailable.

Abandonment

During the abandonment phase of an oil and gas operation, restoration work would be required to remove signs of drill pads and tram roads. It is assumed that seismic lines would be restored prior to the abandomnet phase.

Conclusion

Table 3-2 shows how different soils may be impacted by these activities. Up to 560 acres of soil could be adversely affected by oil and gas operations. To the extent the impacts occur to soil associations "moderately" or "severely" impacted by such operations, the effects would be significant.

Preliminary Investigation

Off-road vehicule activity during this phase may result in accelerated erosion and gullying, particularly during and following wet periods. Such erosion may occur especially in areas on steep slopes or drainage crossings would be especially susceptable to such erosion.

Damage to the ground water system could occur should explosions detonated for seismic work occurred at or near spring sources. Small explosive charges used for spring development have occasionally resulted in spring failure either by sealing off fractures from which the water emerged or by creating new flow patterns away from the source.

Exploration, Development and Production

Earthmoving activities, such as drill pad preparation, reserve pit construction, and road construction, may cause increased sediment production and gullying. Such impacts would be significantly greater on steeper slopes, where drainages are crossed, and during and after wet periods.

When drainages are crossed using fill material and culverts, additional channel scouring could occur.

Surface waters, to include springs, could be contaminated by drainage of overland flow across soil contaminated by drilling by-products such as drilling mud, ground rock, or localized oil spills.

If brine--and other non-potable water with heavy salt concentrations--produced with the oil is allowed to discharge over the surrounding land or into nearby drainages, precipitation on rocks and on the channel surface itself is possible. Also, high salt concentrations in water discharged over the surrounding soil surface may result in the development of a layer of low permeability, resulting in stress on surrounding vegetation.

Damage to fresh water aquifers during the development and production phases could occur through direct contamination of the fresh water aquifer by oil, by hydrogen sulfide if associated with natural gas, and by brines or other non-potable water produced (Campbell, 1973).

When wells are being developed in areas with little subsurface control, an unexpectd high pressure zone could result in a blowout, contaminating a fresh water aquifer above the oil bearing strata. Similarly, sloughing off material around the drill string (the "drive train" of connected pipe that transmits the turning power to the drill bit) can result in oil escaping upwards along the outside of the casing, contaminating fluids in the upper strata. Hydrogen sulfide is often associated with natural gas deposits. When inter-strata communication occurs, as described above or by other means, fresh water reserves could be contaminated on contact.

Brine water is often associated with oil, occurring together in the same strata. Communication between aquifers could result in brine waters or other such non-potable waters contaminating fresh waters. Furthermore, brines occurring with oil could create problems of disposal. The use of evaporation pits could result in the contamination of shallow fresh water aquifers by vertical and horizontal movement of brine water through the soil. Discharge of these waters into drainage channels could also result in shallow acquifer contamination as described above.

Extraction of ground water for drilling purposes could effect spring flow if such drilling occurs near springs. However, Smith, et al (1969) noted that small periodic withdrawals of as much as five gpm would have little or no effect if wells were drilled 500 feet of more downstream of the spring. Effects on drainage-associated phreatophytes would also be minimal given small withdrawals.

Abandonment

Special problems are associated with well abandonment. Improper welds, split seams, corrosion pitting, etc., of the casing could allow continued communication between the acquifers long after the well has been abandoned if proper well-plugging techniques are not use. Where improperly sealed, surface water, bearing biological or chemical contaminants, could drain into the well.

Beneficial results of the abandonment phase, either after oil production or in the case of "dry" holes, could be the availability of the wells for water extraction by the BLM or State of Nevada for use in the RRCRL.

Conclusions

Both surface and ground water could be affected by oil and gas exploration and production in the RRCRL. Impacts to surface waters could include pollutions by various contaminants and accelerated erosion. Ground water quality could be deletoriously affected by introduction of contaminants into fresh water aquifers or reduction in flow to springs and riparian zones.

All Phases

Leasing, by itself, would have no impacts on the geology of the RRCRL.

Were oil or gas to be discovered in economic quantities during the exploration phase, then development of the field and recovery and use of the resource could proceed, resulting in the ultimate depletion of the resource in that location.

During the exploration, development, and production phases there could be requirements for agregrate and sand for construction and road building purposes. These materials are available from both public land and private enterprise sources. In either case, there are adequate amounts in Las Vegas Valley to satisfy the demand without hindering response to existing and future demands for this resource.

Subsidence, or sinking of the earth's crust caused by the depletion of an oil/gas reservoir, is a very remote possibility unless the hydrocarbons have accumulated in unconsolidated sediments. In most cases oil or gas occupies natural connected voids within solid rock. Removing the oil or gas would have little effect on the strength of the rock.

Induced seismicity, a procedure of injecting fluids into fault zones, lubricates the zone and reduces friction. This could create a man-made earthquake. Its purpose, in theory, is to relieve built-up stresses along active fault zones by creating small quakes rather than let nature accomplish it all at once. In oil fields, fluids such as water are sometimes reinjected into the subsurface as a secondary recovery method. The chances of earthquakes being triggered by this procedure, assuming fault zones are present in the RRCRL, is very remote since the operator would be merely replacing one fluid with another.

Conclusion

Except for the depletion of a non-renewable resource, no significant impacts would occur.

LIVING COMPONENTS

VEGETATION

Oil and gas development would have a variable impact on vegetation. The extent of the impact depends on several factors including (a) the type of vegetation, (b) the degree of slope, (c) the type of soil, (d) the amount of precipitation, and (e) the volume and size of the traffic.

Preliminary Investigation

Seismic work, in some cases requires off-road travel which crushes plants. In areas with arroyos, dirt work would be necessary to get equipment across. This could eliminate small areas of vegetation. These activities could disturb or destroy approximately one acre of vegetation per mile of seismic line for a total of up to 160 acres. In areas which have low potential for rehabilitation (See "Surface Rehabilitation Potential" Map) it could take as many as 50 years to revegetate naturally. With considerable effort it could probably be rehabilitated in 5 to 10 years. Any lines done through areas of unique vegetation, see "Vegetation Type" Map might eliminate unique plant species--including relict stands of ponderosa pine--which probably could never be replaced.

Exploration, Development and Production

The construction of well pads and tramroads would initially destroy 400 acres of vegetation. Approximately 44 acres of vegetation would be permanantly removed, assuming that 20% of the 35 wells (7 wells) were put into production. If any of the well sites or roads were located in areas designated as unique vegetation some or all of the sensitive species could be destroyed and could probably never be replaced.

Successful revegetation of all disturbed areas in the Level 2 and 3 class (See "Surface Rehabilitation Potential" Map would be marginal and rehabilitation of the area could take from five to 50 years, or longer, depending on the type and level of treatment. Areas in the Level 2 Class should have enough potential to be revegetated in five to 10 years with fair to good success, depending on the site (i. e. soil depth, precipitation, and native vegetation present). Areas in the Level 3 class would be very difficult to revegetate, both naturally and through introduction of non-native species by seeding and/or transplanting. Areas in the Level 1 class should be revegetated in a fairly short time (three to five years) both naturally or through seeding.

The major impacts during production would be associated with placement of storage tanks and pipelines necessary to transport the oil or gas to processing facilities. At this time these impacts are unquantifiable due to lack of data. Other impacts could occur to vegetation through oil spills or pipeline leaks, and the construction of burning pits or waste disposal areas.

Abandonment

The major impact to vegetation resulting from abandonment would be the disposal and rehabilitation of reserve pits and drill pads. If no efforts are made to bury or haul away drilling mud then rehabilitation would probably be very slow and might not occur for as many as 50 years. With extensive treatments these areas could be rehabilitated in 5 to 10 years in most areas.

Conclusion

Vegetation on approximately 560 acres could be destroyed initially through drilling, road building and seismic activity. Forty-four acres of vegetation would be permanantly eliminated (or through the term of the wells, production). Any unique species damaged or destroyed could be lost and might never return to the area. Disturbed areas in the Level 3 rehabilitation class might take as long as 50 or more years to recover. Oil spills and pipeline leaks could eliminate additional vegetation. Overall, the loss initially of 560 acres of this type of vegetation should have only a small impact on the whole vegetative community except in areas of unique vegetation which could be lost permanently if drilling activities disturbed the habitat and individual species were eliminated.

WILDLIFE

Approximately 160 acres of wildlife habitat would be impacted during the preliminary investigation phase of oil and gas operations in the RRCRL. An additional 400 acres would be disturbed during the exploration, development and production phases. The severity of the impact to wildlife would depend on where the disturbance occurs.

A study by Bury et al (1977), estimated the number of small vertebrates (birds, reptiles, and small mammals), within a cresote habitat type at approximately 27 animals per acre. The cresote habitat is similiar to what can be found in the Red Rocks are below 4,000 ft. elevation. Approximately 15,000 small vertebrates could be displaced or destroyed should 560 acres of habitat be destroyed. Assuming total small vetebrate density in riparian or desert wash areas is similar to the bird densities indicated in Chapter 3, then the impacts to wildlife if riparian or wash areas are disturbed would be perhaps fifty times greater than disturbance on surrounding open desert. The loss of 560 acres of open desert probably would not significantly impact the total population of most wildlife species inhabiting the RRCRL. However, a severe impact to almost all wildlife species could result if 560 acres of riparian, desert wash, or unique vegetation were eliminated.

Many toxic substances (i.e. drilling mud with its additives, brines produced from the well, and diesel fuel from drill rig engines) are associated with oil and gas development. If these toxic substances enter the waters associated with riparian areas, sickness or death, depending upon toxicity levels, dilution, length of exposure, or amount of use, could harm some animals. Accessible fluid-holding pits could expose wildlife to entrapment and polluted waters.

Additional roads and the associated increase in vehicle travel could increase road kills and/or the removal of animals through collection as pets.

The probable impacts on particular animals are discussed specifically in following sections.

Threatened or Endangered Species

The American peregrine falcon is the only Federally-listed endangered species that might be affected by oil and gas development in the RRCRL. The possible impacts to this species are described under Raptors and Other Birds. Two State-listed rare species, desert tortoise, and Gila monster, could be affected. The spotted bat, another State-listed Rare Species, could also be affected if it exists in RRCRL.

The spotted bat is sensitive to human disturbance (personal communication Dr. O'Farrell). It may not be able to tolerate the level of intrusion that would be associated with oil and gas development near its likely habitat of sandstone cliffs. The spring areas in the RRCRL provide the environment needed to support insects that the spotted bat feeds upon.

Development at these springs (See The "Water and Flood Hazards" Map) could be detrimental to the spotted bat, if it is present in RRCRL.

The desert tortoise and Gila monster habitat is shown on The "Wildlife Habitat" Map. Oil and gas development in this area could remove habitat important to these species. Additional roads, and subsequent increased vehicle travel, could increase road kills and/or removal of these animals as pets.

Bighorn Sheep

Bighorn sheep are generally intolerant of extensive human activity as would be associated with oil and gas development (McQuivey, 1978). Such development particularly in the crucial yearlong habitat identified on the "Bighorn Sheep Habitat" Map could probably cause bighorn sheep to abandon the area. This could force the animals into adjacent habitat that may already be occupied at carrying capacity. Eventually the overall bighorn sheep population (160 animals) in the RRCRL and surrounding area could decline. Any activity that would decrease or eliminate waters in bighorn habitat could be detrimental also.

Raptors and Other Birds

The removal of 560 acres of native vegetation could result in lost habitat for a variety of birds. The species affected would depend upon the type of habitat removed. The nests and newly hatched young of ground and shrub nesting birds could be the most severely affected. Most raptors, particularly eagles and falcons, are intolerant of human activities in nesting areas. Cliff nesting habitat is indicated on the "Wildlife Habitat" Map. Nesting by some raptors also occurs in large trees as can be found in the canyon areas of the RRCRL. Activity associated with oil and gas development in or near these areas could cause nest abandonment.

Power requirements, for development and production, would require addtional powerline construction. Powerlines not built to certain specifications may electrocute raptors and other large birds.

Conclusion

Wildlife could be adversely affected by oil and gas development in the RRCRL. Bighorn sheep populations could probably decline if development occurred in crucial yearlong habitat. Development in or near true riparian, desert wash, or unique vegetation areas could be particularly damaging to almost all species of wildlife in the RRCRL. Negative impacts to cliff nesting raptors could occur if development took place near the sandstone cliffs. Desert tortoise and Gila monster habitat could be destroyed if development occurred below the 4,000 foot elevation level. There are few permanent waters in RRCRL and, if lost, that could be detrimental to those populations dependent on those waters.

WILD HORSES & BURROS

Preliminary Investigation

The increase in human activity could cause the wild horses and burros to move out of the immediate area of exploration. This would only be a temporary impact in that as the animals become accustomed to the added activity they would move back into the area.

Exploration and Development

As mentioned under preliminary investigation, the added activity could cause animal to move out into other areas. However, when the drilling and other construction ends the animals would more than likely move back in closer. The mud and brine pits could attract the wild horses and burros. The animals could become entrapped or drink the polluted water. Loss of surface waters for drilling or pollution could reduce or eliminate the wild horse or burro populations.

Production

Extraction, waste disposal, and maintenance would have no impact on wild horses and burros. The mud and brine pit would have the same problem as in the exploration and development stage.

Transporting oil by tankers would cause an impact similar to exploration and development.

Abandonment

This phase would generate only temporary dislocation impacts.

Conclusion

Most impacts on wild horses and burros, except those associated with waters, are temporary and minor.

HUMAN VALUES

VISUAL RESOURCE MANAGEMENT

General

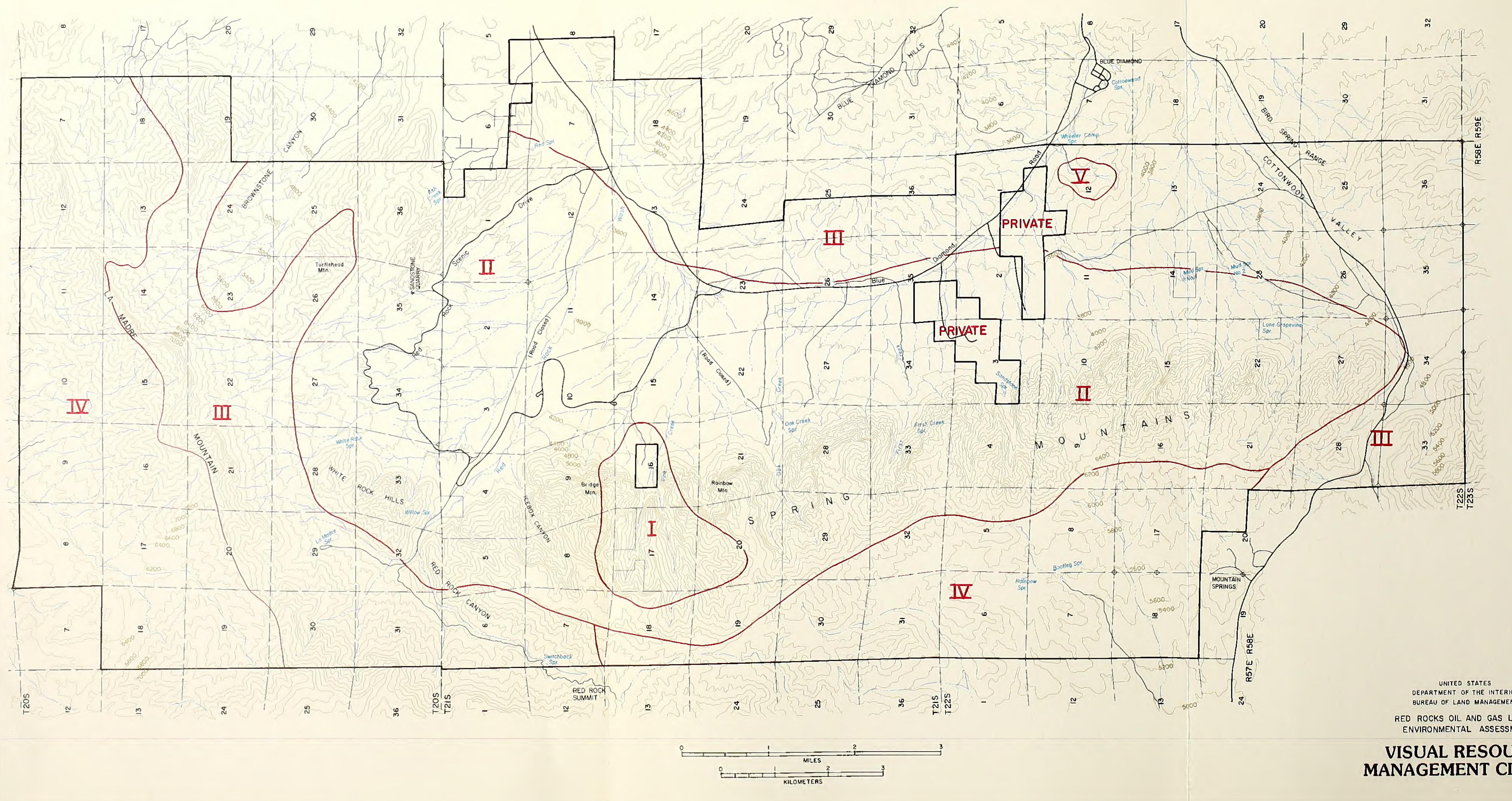
In this section, the concept of direct and indirect impacts is employed in the same manner as in the Recreation section (below) of this chapter. Direct impacts would affect the landscape character of the RRCRL. Indirect impacts are those that would not absolutely preclude sightseeing, but could lower the quality of the experience.

The Bureau of Land Management's Visual Resource Management System (Appendix G) and the VIEWIT computer system (Appendix J) were combined to assess the consequences of oil and gas exploration and development within the RRCRL. The level or degree to which the various phases of oil and gas operations degrade the visual quality of the landscape depends upon the amount of contrast created by the activity in relation to the existing landscape character. Through use of the BLM Visual Contrast Rating System (BLM Manual 8431) the magnitude of direct impacts was measured by separating the landscape into its major features (landform, vegetation, and structures), and then predicting the magnitude of change of each of the basic visual elements (form, line, color, and texture) within each of the features. The severity of impact resulting from each phase of oil and gas operations was then assessed and used as a guide in an effort to identify areas where impacts may not be compatible with BLM management class restrictions.

Four visual resource management (VRM) classes have been identified within the RRCRL (See "Visual Resource Management Classes" Map) for the maintenance of visual-cultural values. One additional management class, VRM Class V, was identified for the rehabilitation of areas where the scenic quality has been impaired. The interim class would hold until the scenic quality level and potential management class of the area reaches a level equal to that of the adjacent land.

Private or state-owned lands have not been assigned management classes as the BLM has no jurisdiction over these lands. However, any development of these lands could have an indirect impact on the visual environment of adjacent public lands.

Management classes are used to identify minimum impact levels to the visual resource when a proposed development action is analyzed using the Bureau's contrast rating analysis system. Site specific development plans were not identified in the proposed action therefore, absolute impacts for each phase of the project cannot be identified. A more generalized approach to impact analysis within various areas of the RRCRL and how the anticipated impact levels relate to the management classes was used in this study.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT

VISUAL RESOURCE MANAGEMENT CLASSES

To analyze the affects of distance and topography the VIEWIT comupter program was employed. The VIEWIT system aids visual resource analysis by its ability to locate and map visible terrain from a single or multiple viewpoints. A series of 37 observer viewpoints were identified within the RRCRL. These viewing points include all overlooks on the Scenic Drive, and additional points on the Pahrump Highway, Blue Diamond Road and the Scenic Drive with a spacing of approximately 1/2 mile. Each observer point was assigned a rank based upon the sensitivity level of the point: 1 for low sensitivity, 2 for medium, and 3 for high (See Table 3-6). Using relative terrain data, the computer determined what areas could be seen from each viewpoint. The value derived was weighed by a distance factor. A distance weight of 1.0 was assigned to all cells within one mile of a viewpoint, 0.5 from one to three miles, and 0.2 beyond three miles. A maximum viewing radius of five miles was used, since beyond this distance visual impacts from oil and gas operations would be insignificant.

The three functions were combined to produce a single map, showing areas of high, medium, and low visual vulnerability. The three classes of visual vulnerability are defined as follows:

High - Cells visible with an average weighted visibility, for all 37 observer viewpoints, of 60% or greater - approximately 24,160 acres

Medium - Cells visible with an average weighted visibility, for all 37 observer viewpoints, of 30 to 59% - approximately 21,120 acres

Low - Cells not visible from any observer viewpoint or cells visible with an average weighted visibility, for all 37 observer viewpoints, of less than 29%

The Visual Vulnerability Map identifies areas where, should oil and gas operations occur, although not compatible with the management class, they would not significantly affect the visual environment because of non-visibility or distance. Conversely, the process identified areas of significant visual impact by oil and gas operations.

Preliminary Investigation

Direct. Geophysical exploration in the RRCRL could use existing roads and trails with little or no impact to the landscape character. However, it is highly probable the existing roads and trails would be inadequate to ensure complete mapping of the subsurface structures. Additional or extended seismic lines could be required and new trails could be blazed across undisturbed terrain. Heavy equipment traveling across the land could destroy the protective vegetative cover creating a strong color contrast between the newly exposed soil and adjacent undisturbed areas. This could directly impact the characteristic landscape, introducing new line, form, and color elements into the landform and vegetation features. Degradation of the landscape character could directly affect the scenic quality class, lowering the rating and the management class, reducing the affected area to an interim Class V until such time as the area is rehabilitated.

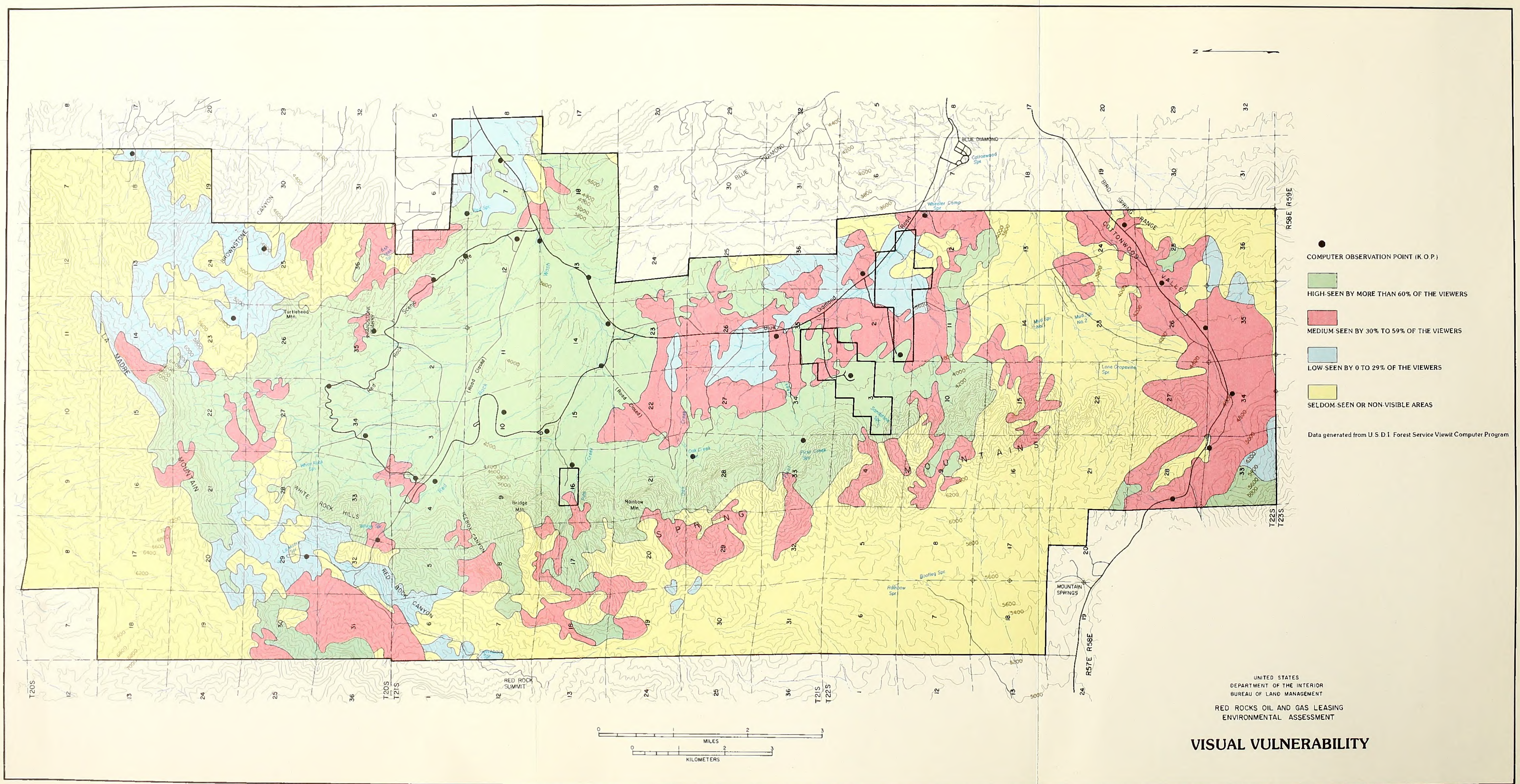
Changes to the landscape character caused by seismic operations is not compatible in the 4,640 acres under VRM Class I designation. Direct impacts to Class II areas could cause significant degradation of the visual values in areas not screened from view by topography or vegetation.

Indirect. Most of the use of the RRCRL is for sightseeing and the user would be highly sensitized to any change in the landscape. Generally, the 160 acres of new linear routes could be highly visible because of the color contrast. Those portions within the 24,160 acres of high visual vulnerability as shown on the "Visual Vunerability" Map could be visible to 65% of the visitors who come to the RRCRL for the visual experience. The indirect impact would be the degradation of the visual experience. Some portions of the approximately 21,120 acres of medium visual vulnerability areas, particularly between Spring Mountain Ranch and the Scenic Loop Road, are an integral portion of the visual experience of the RRCRL and any indirect impact to the sightseeing values of that area could be significant.

In summary, preliminary investigation in VRM Class I areas could exceed allowable contrast ratings. In high visual vulnerability areas and in the medium visual vulnerability areas between the Spring Mountain Ranch and the Scenic Loop Road, west of the Blue Diamond Road, significant indirect impacts could occur.

Exploration - Development

Direct. Direct impacts to the landform, vegetation and structure features of the characteristic landscape could occur during this phase. Potentially, some 400 acres of land could be stripped of all vegetation, roads bladed and drill pads leveled to accomodate the drill rig and associated support equipment. All of the structures and landform modifications required would be very geometric in form, not reflecting any of the line, form, color, or texture or the characteristic landscape. Light colored soils could be exposed and the contrast with adjacent areas could cause the area to be highly visible long after all the drilling and development facilities are removed. The direct impacts could be that all the roads and drill pad sites could be placed in an interim Class V designation until the site can be rehabilitated to its previous scenic quality class rating. This impact could be long term and the probability of complete restoration low.


COMPUTER OBSERVATION POINT (K.O.P.)
HIGH-SEEN BY MORE THAN 60% OF THE VIEWERS
MEDIUM-SEEN BY 30% TO 59% OF THE VIEWERS
LOW-SEEN BY 0 TO 29% OF THE VIEWERS
SELDOM-SEEN OR NON-VISIBLE AREAS
Data generated from U.S.D.I. Forest Service Viewit Computer Program
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
RED ROCKS OIL AND GAS LEASING
ENVIRONMENTAL ASSESSMENT
VISUAL VULNERABILITY
MILES
KILOMETERS
BLUE DIAMOND
BLUE DIAMOND HILLS
COTTONWOOD VALLEY
BIRD SPRING RANGE
SPRING MOUNTAINS
LA MADRE MOUNTAIN
WHITE ROCK HILLS
RED ROCK CANYON
ICEBOX CANYON
BROWNSTONE CANYON
Turtlehead Mtn.
Bridge Mtn.
Rainbow Mtn.
MOUNTAIN SPRINGS
RED ROCK SUMMIT
T20S
T21S
T22S
T23S
R57E
R58E
R59E

The direct impacts could not meet the criteria of VRM Class II areas of high visual vulnerability and in VRM Class I areas. Development within VRM Class II and III areas of medium visual vulnerabiltiy could have variable impacts. These impacts range from highly significant to relatively insignificant, dependent upon the amount of development and the proximity to high use recreation areas. Direct impacts in low visual vulnerability, seldom seen areas and Class IV areas could be relatively insignificant.

Indirect. Indirect impacts created by drilling operations in high visual vulnerability areas and the medium visual vulnerability area, north of the Spring Mountain Ranch and south of the Scenic Drive on the west side of Blue Diamond Road could result in significant degradation of the visual experiences to sightseers in the RRCRL.

Variable degredation of sightseeing values in medium visual vulnerability areas could occur depending upon the amount of development and the perception of the sightseer.

Production

Direct impacts in the form of continued modification of landscape character and indirect impacts in the form of degradation of sightseeing values could extend over the 25 year production phase. These impacts are caused by the addition of pumpjacks, storage facilities, pipelines, powerlines and other production equipment, in an otherwise undisturbed area.

Abandonment

During abandonment, all structures and equipment would be removed, the drill pad and all roads could be recontoured to blend with the adjacent topography, decreasing or entirely eliminating the line and form contrast for landform features. Revegetation, if sucessful, could eventually mitigate the color contrast for landform and vegetation features. Direct and indirect impacts could decrease over time until the site meets the highest or original Scenic Quality Class and Management Class.

Conclusion

No phases of oil and gas operations would meet criteria for VRM Class I areas. In high visual vulnerability zones, all phases of oil and gas operation could cause significant indirect impacts. These indirect impacts could occur over 24,160 acres. Such impacts could be most significant to the vast majority of RRCRL users since sightseeing is the major reason some 65% visit the RRCRL (See Chapter 3, Recreation). In medium visual vulnerability zones, indirect impacts could occur over 21,120 acres. The magnitude of these impacts is proportional to the amount of the development and the proximity to recreational use zones. In the medium visual vulnerability zone between Spring Mountain Ranch and the Scenic Loop Road, the impacts would be significant.

RECREATION

Oil and gas operations in the RRCRL could cause direct and indirect impacts to the recreation resource as a result of imposing an industrial element in a relatively natural setting. Direct impacts are those in which one activity would physically displace another. For example, placing a well drilling rig in a picnic area would force the closing of the area to picnicking.

Indirect impacts are those that would not absolutely preclude the recreational use, but which would lower the quality of the recreational experience. Such factors as noise, dust, and odors would generally affect a 1/4-mile radius from the source (see Methodology, Appendix H) Visual intrusions, also a factor, could affect a larger area. It is not always possible to project the absolute magnitude of these impacts due to the subjective nature of each user's perception of the recreational experience.To further substantiate this assertion, several telephone calls have been made to various agencies and institutions to find information on the impacts created by industrial development on or near a recreation site. The Heritage Conservation and Recreation Service, the Recreation Department of Utah State University, the National Park Service, the Nevada Division of State Parks and several Bureau of Land Management State Offices were contacted. None of these sources were able to provide the information sought.

Preliminary Investigation and Exploration

Picnicking and Camping. Direct impacts at a site such as Sandstone Quarry could cause at least a temporary closure of the site. The exploratory work could probably damage the inherent value of the area, resulting in long term impacts also. Surface disturbance could reduce vegetative screening, lessen scenic values, and create denuded corridors and areas which could interfer with the controlled access and one-way traffic circulation system. Such impacts to a proposed site could force relocation of the site.

Indirect impacts resulting from operations in the vicinity of camping and picnicking areas could occur. Night lighting, and noise from the around-the-clock drilling, could affect overnight camping at Oak Creek. Wind-blown dust from offsite surface disturbances and noise from geophysical blasting could also detract from the recreational experience.

Hiking and Horseback Riding. Direct impacts from exploratory work along existing or proposed riding trails, or a developed hiking trail, could vary. The disturbed route resulting from seismic lines could be undesirable for hikers, due to the broken and fractured surface, dust, excessive width, and a road-like appearance. Such a route could be somewhat more compatible as a riding trail, and with modifications, could create additional riding opportunites.

Indirect impacts from exploratory activity near a riding or hiking trail could be at least a short term impact to the natural ecological values of the area, such as displacement of wildlife, noise, and the introduction of machinery and equipment. Longer term impacts could include short cutting between trails and old seismic lines, visual scars, and a reduction of the naturalness of the area.

Visitor Center and Interpretation. Direct impacts to the Visitor Center site could necessitate relocation of the facility. The site was selected for several reasons: Accessibility to the Scenic Loop Road entrance; a panoramic view of the escarpment, and minimum visual impact to sightseers along the Scenic Loop Road and at recreation sites. Finding another suitable site would be extremely difficult.

Direct impacts to potential interpretive sites could also be severe. These sites are selected for their inherent interpretive value and can therefore not be relocated at will.

Indirect impacts to the Visitor Center could be intrusions visible from the carefully selected viewpoints in and around the building. One of the main functions of the Visitor Center, to introduce and encourage use of the RRCRL, could be undermined by the visibility and awareness of oil and gas operations in an otherwise natural-appearing landscape.

The value of interpretive sites could be reduced by the intrusive elements of exploratory work such as noise, fumes, dust and distruction of natural qualities adjacent to the object of interpretation.

Sightseeing. There could be no direct impacts to sightseeing. However, there could be extensive indirect impacts, since sighseeing is associated with all of the other recreation uses of the RRCRL. Thus, visual impacts affecting any of the recreation sites or use areas mentioned in the existing environment section would impact the sightseeing opportunities. Impacts would be heaviest in the high use and high quality scenic areas: Scenic Loop Road, Calico Hills, Brownstone Canyon, La Madre Spring, the canyons and valley floor from Pine Creek to First Creek, Spring Mountain Ranch, Bonnie Springs/Old Nevada and the escarpment and La Madre Mountains. For a more complete discussion of visual impacts, see the Visual Resource Management Section (above).

Sightseers, as well as all other recreationists, could be exposed to safety hazards resulting from concurrent use of RRCRL roads by the heavy equipment and trucks of the oil and gas leasee.

ORV Use. Oil and gas-related traffic could result in the opening of older, closed roads as well as the addition of new roads and trails. This could encourage renewed ORV usage in RRCRL, in contradiction to the management policy of the area for the last several years, which has been to close many of the roads throughout the RRCRL.

Indirect impacts could result from increased vehicular access to otherwise remote areas. This would cause increased fire hazards, vandalism, litter, a reduction of the naturalness of the areas, and the addition of spur jeep trails caused by the ORVers.

Other Recreation Activities. Bicyclists and joggers using the Scenic Loop or other roads in the RRCRL could be affected by heavy equipment traffic, which might displace some of the recreationists. Others may find the area less suitable for these activities as a result of increased traffic. Rock climbers and scramblers might experience denial of access to popular climbing areas. In addition to those impacts affecting hikers, impacts to backpackers and hunters could include at least a temporary deplacement of animals, a degradation of the primitive character of the mountainous areas, and better access through the addition of new roads and trails.

Spring Mountain Ranch. There would be no direct impacts from oil and gas activities to the Spring Mountain Ranch because the oil and gas rights of the ranch are state owned. However, the indirect impacts to the ranch from oil and gas activities on adjacent public lands could be severe and are similar to those within the remainder of the RRCRL and discussed below. Loss of surface waters currently sustaining the verdant character of the ranch could eliminate its recreational value.

In addition to the indirect impacts already identified for the RRCRL, the Nevada Division of State Parks staff has emphasized several other concerns: increased access to the Ranch could result in overuse of fragile areas, trespass activities, and increased fire danger. These problems would highlight a need for a better security and additional law enforcement capabilities.

Development

Development of oil and gas leases would significantly increase both the direct and indirect impacts to the recreation resource. The nature of the impacts would not change materially from those previously discussed under a exploration; however, the intensity and magnitude of the impacts would rise sharply. Impacts would result from facility construction at those sites selected for development, as well as from the tramroads, utility lines, and pipelines constructed to support these sites. The size and location of development sites and support facilities would determine the degree of impact to recreation opportunities and use. There could be 400 additional acres of surface disturbance than experienced during exploration. A substantial amount of the recreation resource could be eliminated which would further reduce the already limited supply of recreation opportunities in the RRCRL. The intensity of indirect impacts under the development phase could also be considerably greater than during exploration. Distractive noise and odors would occur not only at the development sites, but also within a 1/2 mile-wide envelope (1/4 mile on each side) along RRCRL roads used by the construction crews. Impacts to the visual resource and feeling of naturalness could be particularly heavy. Visual impacts could increase not only in magnitude, but also in type. Many of the facilities associated with oil and gas development (i.e. tanks, drill towers, pumps, utility lines, and buildings because of their height) could be much more visibly obtrusive than the elements associated with exploration. For a further discussion, see the VRM section. The intensity of the impact of a concentration of development activity in one area of the RRCRL could depend on the area involved. A concentration of development activity in the Scenic Loop area could possibly destroy the recreational value of the area.

Production

Impacts to the recreation resource during the production phase could be similar to those previously described under exploration and particularly under development. Only those impacts which are in addition to those during development, or would be less than during development, will be discussed in this section.

If an oil or gas reservoir must be pumped, an internal combustion engine could be required. That could increase noise, odor, fire hazards and air pollution, particularly within a 1/4 mile radius of the pump. If commercial electric power is used, the visual impacts of power poles could occur. If the gas or oil flowed naturally, these impacts could be avoided.

Production requires transportation of oil and/or gas from the site either through pipelines and storage tanks, by trucks, or by a combination of the above. Most of the potential direct impacts could occur along the transportation routes. Examples could be oil spills, and safety hazards from truck traffic, and physical damage to the environment.

Indirect impacts from the transportation could include air pollution, noise pollution, traffic congestion, and road damage.

Conclusion

Oil and gas operations in the RRCRL could cause substantial impacts to the recreation resource.

Direct impacts could occur from the placing of an oil and gas activity on or immediately adjacent to an existing or master-plan-identified developed recreation site. The two uses would be mutually exclusive, resulting in the loss of the recreation use. This would reduce the overall recreation opportunities in the RRCRL.

The degree of indirect impacts is subjective to the recreationist involved, ranging from minimal awareness of the oil and gas activity to outright refusal to continue recreational use of the area.

Should recreational use decline in the RRCRL, other local recreation areas could find carrying capacities approached or exceeded by additional use.

Indirect impacts could occur when noise-, odor-, or dust-producing oil and gas operations are placed within 1/4-mile of a recreation site. Visual intrusions could often exceed the 1/4 mile buffer. Such impacts could significantly reduce the quality of the recreational experience. The magnitude of the impacts would vary as to the area in question . Prime recreation areas, those possessing a large number of recreation opportunities and/or receiving a moderate to high amount of use (such as the Scenic Loop Road, Calico Hills, Brownstone Canyon, LaMadre Spring, and the canyon south to and including Spring Mountain Ranch), would be heavily impacted. Back country areas, such as the top of the escarpment and the LaMadre Mountains, could be impacted by increased access and the placement of man-made structures in a natural setting.

Peripheral areas, some of which are already impacted by non-recreation oriented land uses and that are at times perceived as outside "The Red Rocks," would be less impacted by oil and gas exploratory activities. Examples are the area east of the Blue Diamond Road, the Pahrump Highway area and the Blue Diamond area.

Oil and gas operations are in direct conflict with the RRCRL Master Plan which states the area is to be managed for Recreation. The $8 million in public funds spent or committed in the RRCRL by the Federal government and the State of Nevada could be adversely risked.

CULTURAL RESOURCES

Preliminary Investigation

Off-road vehicle travel and the use of vibrating equipment could result in the crushing and/or displacement of cultural material along seismic lines. More severe impacts to cultural material could occur if the surface had to be disturbed by "blading" or other dirt work to obtain vehicle passage. This could radically reposition the existing vertical and/or horizontal arrangement of cultural deposits so that valuable archaeological data would be lost. Because cultural resources are not uniformly distributed over the study area, the degree of the impact depends on the alinement of the seismic work with relation to both known and predicted cultural resource sites.

Several indirect impacts to the cultural resource could occur. New roads could open previously unknown areas to vandalism and illegal collectio;n of antiquities. Road networks or vibrating equipment could impact the visual integrity of the environmental setting of some cultural resources such as those found in Brownstone Canyon which has been nominated to the National Register of Historic Places as an Archaeological District. Detonation of explosive charges could not only disturb surface and subsurface placement of artifacts, but it could also cause destruction of rock art, shelter caves, or sites containing architectual fractures. This latter would be a function of both the size of the charge and its distance from the cultural resource.

Exploration, Development, and Production

Impacts similar to, but more extensive than, those discussed in the previous section could occur under these phases since the surface disturbance could be greater both vertically and horizontally. In addition, during the production phase, potential oil spills onto on area having cultural resources could result in the degradation of the site's integrity. Indirect impacts could result from visual degradation of site's containing cultural resources. Again, the degree of impact cannot be calculated since it depends to a great extent on the location of oil and gas operation in relation to the location of the known or predicted cultural resources neither of which are uniformly distributed over the RRCRL.

Abandonment

No direct or indirect impacts to cultural resources are anticipated during this phase.

Conclusion

Oil and gas operations in RRCRL could pose significant hazards to known or predicted cultural resource sites.

SOCIO ECONOMICS

General-Economics

Economic impacts of the proposed action may not be significant, particularly in light of the low probability of finding oil or gas in the area. GS classifies the RRCRL as a rank "wildcat area". In 1978 only 15% of new field wildcat wells were completed as producers and only 10% of these produced significant quantities. Therefore, the total significant strike level was only 1.5%.

In the event that some development does occur, economic impacts during the various stages of operation would be:

Leasing - Preliminary Investigation: Economic

When the leases are granted an annual per acre lease fee will be charged. If the entire 60,910 acres were to be leased, $60,910 in rent would be paid to the U. S. Government. Half would be turned over to the State of Nevada. Clark County would receive an additional $2,700 from its ad valorem tax on the leases. These are insignificant contributions to these entities budgets.

Seismic testing crews usually employ about 20 workers for about three or four months in an area. This would be insignificant when compared to the total Las Vegas employment of over 200,000. It is unlikely that any local residents would obtain employment on the crews.

The reduction in the recreation value of the area accompanying this phase could reduce visitor use at Old Nevada, thereby reducing employment and payrolls.

Although the RRCRL may experience a decrease in visitor use, it is not likely that a reduction in visitation use to Las Vegas would occur since only 8% of Las Vegas visitors are fully or partially motivated by sightseeing. Many other sightseeing opportunities for tourists are available in the area, e.g. Hoover Dam, Lake Mead, Mt. Charleston.

Exploration and Development: Economic

Setting up and drilling a well can employ up to a hundred workers for a short period of time. Full-time crews usually consist of 20 to 30 workers for about eight or nine months for a well of the depth anticipated. Most of the workers would come from experienced non-local crews, although some locals may obtain employment in road and pipeline construction. Each well could cost from $2.5 million to $8 million. Most of this money would flow directly out of Las Vegas with little or no secondary impacts since neither skilled workers or oil and gas drilling equipment are available in the area.

Therefore, this phase is not expected to significantly impact the economy of Las Vegas.

Production: Economic

Clark County would receive taxes on producing wells at the rate of $2.25 per $100.00 of net proceeds. This is not likely to be significant unless a large field is discovered. If so, these revenues could help to offset increases in public service expenditures required by any population influx.

Some locals may find employment during this phase in maintenance of extraction and transportation facilities. This is not expected to significantly effect the Las Vegas economy.

In the event that a significant oil and gas field is discovered, businesses such as refineries and oil field equipment dealers could be established. Depending on the size of these facilities, a significant increase in income and employment could occur. This would be beneficial to the Las Vegas economy because it would broaden the economic base. At present, Las Vegas is highly dependent on tourism, making it highly vulnerable to fluctuations in that industry.

From a national perspective, a significant strike could help reduce dependence on foreign oil, thus reducing further erosion of the dollar. Were oil and gas to be discovered in economic quantities during the exploration phase, royalty revenues could substantially increase the oil and gas income from the RRCRL leases to the Federal and State governments. The amount of the potential income is impossible to calculate at this point. Indeed, the fact of income itself is speculative based on the statistical likelihood of there being less than two chances out of a hundred that oil or gas would be discovered in the RRCRL.

Were the leases granted, and economic quantities of oil or gas discovered in the RRCRL, economic benefits of undetermined amounts could acrue to the three individuals and one corporation who have applied for the leases. Similarly, the unexplored leaseholds could increase in value to the lessees should oil and gas be discovered in the Overthrust Belt close to the RRCRL. The closer the discovery, the more value could acrue to the lessee.

Abandonment: Economic

Unless a large field were to be developed, abandonment of oil production activities would cause no significant economic impacts.

If a large field was developed and dependent businesses were established, cessation of activities could lead to a large out-migration from Las Vegas. This could result in public facilities operating inefficiently at under capacity while at the same time the total tax base would be reduced by the withdrawal of oil and gas activities. If this situation were not carefully planned for, local governments could be placed under severe budgetory constraints.

All Phases: Social

A decision to grant oil and gas leases in the RRCRL could produce significant public opposition to that decision, as evidenced from the public comment generated against leasing by the draft environmental assessment in November, 1979. That strong opposition came despite the apparent conclusion of the assessment that leases ought to be denied. A decision to grant the leases, after the initial opposition to such a course of action, could well result in stronger forms of protest than experienced so far.

The quality of life in Las Vegas in terms of natural outdoor recreation opportunities could be reduced during the preliminary investigation and exploration phases without any economic return ever being realized. On the other hand, should the operation proceed into the production phase, the quality of life reduction in terms of natural outdoor recreation would continue for a longer period.

In the event that a large field is developed, an influx of oil and gas workers could occur. This is not expected to significantly alter the character of the Las Vegas community given the relatively young, mobile, heterogeneous nature of the current population.

Conclusion

The proposed action would not bring significant economic benefits to Las Vegas unless a large producing oil and gas field were discovered. Statistical experience indicates that likelihood at less than two chances out of a hundred.

The likelihood of reduced natural outdoor recreation, and the actual reduction during preliminary investigation, exploration, and development phases--especially if no oil or gas were discovered--would probably arouse great local opposition to a leasing decision to grant leases throughout the entire life of the project.

WILDERNESS

All Phases

On the portion of the RRCRL which is under wilderness review, the cumulative impact of 35 wells and their tramroads could be severe. It is impossible to predict exactly how many wells, between one and 35, could constitute an unacceptable cumulative impact. Each well could add a presently unknown increment of impact, based on its precise location and characteristics. For this reason, it is conceivable that the development of only one well could seriously impair wilderness values in the RRCRL.

LAND USE

Preliminary Investigation

Off-road vehicle travel, road and trail construction, and seismic operations conducted in the Pine Creek area could cause some destruction of botanical, geological, zoological and scientific and recreation values currently protected on 150 acres by withdrawal under PLO 3530. Any degradation of these values could conflict with the purposes for which the protective withdrawal was invoked. Surface disturbance activities occuring in the Calico Hills and south of the visitor center site could conflict with the Nevada State Parks R&PP application N-7293 to establish a recreation area in this vicinity. Pending disposition of this application, any activity in these areas causing degradation of surface resources is incompatible with the State's proposal.

Detonation of small explosives, ORV travel, and road construction within 1/4 mile of private lands within RRCRL could influence recreational land uses at Spring Mountain Ranch, Bonnie Spring Ranch, and the Old Nevada. Such activity occuring within these zones could be incompatible with recreation activities and could result in a decrease in visitor use to these areas.

The communities of Mountain Springs, Oliver Ranch, Calico Basin, and Blue Diamond could also be influenced by blasting, ORV travel, and road and trail construction occuring within 1/4 mile of homesites. The noise and dust associated with these activities could have an adverse affect on the residential atmosphere of these areas.

Exploration and Development

The conflicts with existing and proposed land uses identified above in association with preliminary investigation activities could intensify as a result of operations under the next two phases. Oil and gas well drilling and associated work involve significantly greater degrees of surface disturbance and on-the-ground activity, thereby increasing incompatability with adjoining land uses.

Additional rights-of-ways could be required for support facilities such as roads, pipelines, storage facilities, electrical power and telephone communication. Road development could increase accessibility to more areas in RRCRL that may or may not be used by recreationists. Management and administration problems may develop from use of the roads by the public and could lead to conflicts with oil and gas operations.

Oil and gas development could have severe detrimental impacts on private land recreation areas and communities if allowed to occur within 1/4 mile of these developments. The noise, odor and visual intrusion created by development could decrease visitor use to Bonnie Spring Ranch, Old

Nevada, and Spring Mountain Ranch. The level of decrease in visitor use to these areas is not known. During a telephone interview with the owner of Bonnie Spring Ranch on January 18, 1980, he stated his opinion that visitor use to his recreation facilities would be totally eliminated if oil and gas leasing and development is allowed in RRCRL. The ability to amortize capitol investments in recreation facilities could be hampered by a decrease in visitor use. The owner also indicated that if the decision is made to issue oil and gas leases in RRCRL, particularly adjacent to his property, he would most likely lease out his land for oil and gas development as well.

Road and drillsite development near residential areas may curtail homesite development for similar reasons (noise, odor, visual intrusion). The residential climate of these areas would be adversely affected and may result in some homeowners selling out and relocating to other areas. Property values may also be affected if development operations are allowed within 1/4 mile of residential areas.

Development activities within the limits of the proposed right-of-way corridor could influence the utilization of the corridor for future powerlines, telephone lines, and water and gas pipelines. Utility lines through this area could have to be rerouted to avoid oil and gas development which could limit full use of the defined corridor.

Oil and gas development near existing above-ground and underground utility lines could present safety hazards.

Production

Those conflicts with existing land uses associated with the development phase could be more lasting during production due to the permanant nature of this phase of oil and gas operations. On the other hand, those wells that are unsuccessful could be removed and the site rehabilitated thereby eliminating, to a great extent, land use conflicts.

Additional rights-of-way for support facilities and transportation of oil and gas could be required during the production phase. A suitable site for waste disposal, if not already available, might have to be established.

Oil and gas production on sites within the proposed right-of-way corridor could not only influence routing of future utility lines through this area but could preclude the use of all or portions of the corridor. Oil and gas pipelines used to transport products from these sites are technologically incompatible with nearby transmission lines. Sufficient spacing and proper routing of production lines within the corridor could be required to reduce conflicts. Road development for truck transportation of oil and gas products from these sites could have a less severe impact on future corridor use.

The use of trucks to transport oil and gas products could require roads constructed for all weather use and conducive to rapid transportation. Some modification of existing roads may be require to meet these requirements.

Abandonment

Removal of equipment, restoration of surface disturbance and a reduction of on-the-ground activity on sites that are abandoned could eliminate, to a large extent, many of the adverse impacts to surrounding land uses anticipated during the exploration, development and production phases.

Conclusion

The most significant land use conflicts would relate to oil and gas activities on the Pine Creek Research Natural Area, the NDSP R&PP area, and the existing and proposed utility corridors along the Pahrump Highway. Other significant impacts could occur as a result of oil and gas exploration and development activities near private recreation areas and communities.

RESOURCE INTERRELATIONSHIPS

All Phases

The resource relationships in the RRCRL are closely interwoven and fragile. Adverse effects at the lowest levels of the system, such as soils or water, spread rapidly through the dependency chain, multiplying as they go. A drilling operation on a bench below the escarpment may disturb only two or three acres, a relatively small area: but the impacts of that disturbance spread to greater proportions as reacreation and visual resources are affected.

The cumulative impact could be most severe in the area below the escarpment, between it and the Blue Diamond Road and from the Calico Hills to Old Nevada/Bonnie Spring Ranch. This is the area most people mean when they speak of "Red Rocks." It is the area rated highest in visual values, and where the majority of the recreational takes place. On another tack, it is the area where the unique vegetation types are and where vegetative rehabilitation potential is lowest. It is also the area where committed public funds are most at risk.

A relationship may also be cited between this recreational use and the energy needs which are the ultimate source of the proposed action. By adversely impacting the quality of the natural recreational experience in the RRCRL, the search for energy supplies may prompt a net increase in energy demand as Las Vegans expend greater amounts of energy seeking elsewhere the level of recreational quality lost in RRCRL.

Proposed Action Impact Matrix

The following matrix displays on a quarter-section basis those elements of the RRCRL environment which would be affected by the proposed action. The matrix covers most of the significant impacts identified in the foregoing section. However, the impacts of some oil and gas operations cannot be displayed on the matrix because either the affected environment element is study-area-wide, or the operation itself is not site-specific enough at this point. In those cases, the earlier narrative description must suffice to identify the impact.

Listed below is a key to the horizontal index on the impact matrix:

1. Topography - Slopes greater than 25% in 75% or more of the quarter section.
2. Soils - Erosion (also includes water).
3. Soils - Productivity Loss and Soil Compaction.
4. Water - 100 Year Flood Plain Hazard.
5. Water - Spring, Well or Reservoir Location.
6. Wilderness - Proposed or Recommended Wilderness Study Area.
7. Vegetation - Unique Vegetation Type.
8. Wildlife - Important Wildlife Habitat, includes: Bighorn Sheep Crucial Habitat; True Riparian Habitat; Desert Wash Habitat; Raptor Cliff Nesting Habitat.
9. Wildlife - Desert Tortoise and Gila Monster Habitat.
10. W.H. & B. - Water Sources for Wild Horses & Burros.
11. V.R.M. - Class I Visual Resource Management Area.
12. V.R.M. - High Visual Vulnerability Zone.
13. V.R.M. - Medium Visual Vulnerability Zone.
14. Recreation - Heavy Use Area.
15. Recreation - Moderate Use Area.
16. Recreation - Developed Recreation Site.
17. Recreation - Master Planned Recreation Site.
18. Recreation - Indirect Impact Zones (also includes Land Use).
19. Cultural Resources - National Register of Historic Places, Nominated or Potential.
20. Cultural Resources - Significant Concentration of Archaeological Resources.
21. Land Use - Existing Utility Line and Proposed Utility Corridor.
22. Land Use - State Lands.
23. Land Use - State Recreation and Public Purposes Act Application.

IMPACT MATRIX

T. 20S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

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IMPACT MATRIX

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IMPACT MATRIX

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IMPACT MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

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SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

T. 22S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

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IMPACT MATRIX

T. 22S

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SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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T. 20S

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SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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IMPACT MATRIX

T. 21S

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SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
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ALTERNATIVE 1 - NO ACTION

No impacts would occur to the non-mineral natural resources or recreation-related human values found within RRCRL under this alternative.

Denial of the leases would mean that no oil and gas lease fees and tax revenues from the RRCRL would accrue to the various governments as at present. The lease applicants would derive no benefits from their applications; however, the likelikhood of the leases having economic oil and gas resources is less than two chances in a hundred.

The United States could suffer a hypothetical loss in the current energy crisis if leases were denied. However, the loss would not be absolute as the oil and gas resource, if it exists, would still be present for future recovery.

Conclusion

No significant impacts would occur as a result of this alternative.

CHAPTER 5

MITIGATING MEASURES

MITIGATING MEASURES

Following are mitigating measures intended to offset or eliminate impacts associated with the proposed action. Most could ultimately become lease stipulations. Others, identified by a remark in parenthesis, are intended to become elements of plans or other documents required of the lessee under USGS notices to lessees. They are included here as a reference for reviewing officers of future, tiered, environmental assessments to assure that impacts properly handled at those levels are adequately addressed. A secondary purpose is to assure interested members of the public of full consideration of all impacts at this first stage assessment. "Tiered" measures are not included in the mitigating measures matrix.

The matrix used in this chapter is the impact matrix. The horizontal index on the chart is the same as that used in the impact chapter. The numbers in the chart that show a mitigated impact correspond to the numbers in parenthesis at the end of the statement of that measure in the narrative portion of this chapter.

The "operational measures" are numbered M-1 through M-17.

NON-LIVING COMPONENTS

TOPOGRAPHY

No occupancy or other surface disturbance should be allowed on slopes in excess of 25% without written permission from the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#12)

* * *

M-1. All cut and fill slopes during preliminary investigation, exploration, development, and production should be rounded and warped to blend with adjacent landforms. (Operational measure to be included in NTL-6 plan).

M-2. Upon abandonment, all non-essential roads and drill pads should be obliterated and recontoured to establish natural drainage and to blend with the adjacent landforms. Restoration and rehabilitation plans should be approved by the District Engineer, USGS, with concurrence of the District Manager, BLM, prior to implementation. (Operational measure to be included in NTL-6 plan).

SOILS

No surface occupancy should be allowed on those areas mapped as riparian zones to protect the high water table which is required for these zones to exist. (#2)

In order to minimize watershed damage during muddy and/or wet periods the District Manager, BLM, through the District Engineer, USGS, may prohibit exploration, drilling or other development. This limitation does not apply to maintenance and operation of producing wells. (#13)

There should be no surface occupancy or other surface disturbances on slopes in excess of 25% without written permission from the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#12)

* * *

M-3. No off-road-vehicle use should be allowed during geophysical operations. (Operational measure to be included in NOI.)

M-4. Exploration with ground vibrating equipment and primer cord should only be allowed only on existing roads and trails. In other areas only exploration with single charges should be allowed. Geophones and charges must be carried in by hand, packtrain or helicopter. (Operational measure to be included in NOI.)

M-5. Road construction should be approved by the District Manager, BLM, to ensure that cutbanks and fill are kept to a minimum. (Operational measure to be included in NTL-6 plan)

M-6. When topsoil is removed it should be stockpiled for later use in reclaiming the site. These stockpiles should not be located in live washes or in any area subject to excessive erosional forces. (Operational measure to be included in NTL-6 plan.)

WATER

No occupancy or other surface disturbances should be allowed within 300 feet of the flood hazard areas and major drainages as depicted on The Water and Flood Hazard Map and located within quarter-sections indicated on the impact summary chart. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#5)

No drilling or storage facilities should be allowed within 500 feet of springs, reservoirs, catchments and wells, as described in tables 3-3 and 3-4, and located within the quarter-sections indicated on the impact summary chart. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#9)

No occupancy or other surface disturbance should be allowed on slopes in excess of 25%, without written permission from the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#12)

In order to minimize watershed damage during muddy and/or wet period the District Manager, BLM, through the District Engineer, USGS, may prohibit exploration, drilling or other development. This limitation does not apply to maintenance and operation of producing wells. (#13)

* * *

M-7. Where drainages must be crossed, either wash bottom crossings or built-up crossings should be used. If built-up crossings are used, culverts sufficient for a 100-year flow should be employed. Energy dissipation devices should be used in conjunction with culverts, when required. (Operational measure to be included in NTL-6 plans).

M-8. All disturbed areas involving earth moving operations for site developments should be seeded and mulched in a timely manner concurrently with operations. (Operational measure to be included in NTL-6 plans).

M-9. No discharge from reserve (mud) pits or evaporation pits onto public land should be allowed. (Operation measure to be included in NTL-6 plans.)

M-10. Evaporation pits should be lined with an impermeable substance to prevent infiltration of brines into shallow acquifers. (Operational measure to be included in NTL-6 plans.)

M-11. Use of surface water, including springs, resevoirs, nautral catchments, etc., should be coordinated with the current holder of water rights, subordinate to public water reserves as set forth in 43 Code of Federal Regulations 2311. (Operation measure to be included in NTL-6 plan)

LIVING COMPONENTS

VEGETATION

No occupancy or other surface disturbance should be allowed on or within 1320 feet of the unique vegetation types designated on the Vegatation Type Map. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#6)

Vegetation on all areas disturbed by any phase of the oil and gas leasing process should be rehabilitated and required vegetation should be re-established to the satisfaction of the District Manager, BLM. Prior to commencement of any surface disturbance, lessee should have an approvedvegetative reclamation plan developed and approved in writing by the District Manager, BLM. (#18)

WILDLIFE

No occupancy or other activity on the surface should be allowed on the important wildlife habitat as shown on the Bighorn Sheep Habitat Map and the Wildlife Habitat Map. (#2)

Before any surface disturbing activities are allowed in desert tortoise and gila monster habitat, a wildlife biologist acceptable to the District

Manager, BLM, should inspect the area to determine if these animals are in fact present. If any are found, a determination should be made whether movement of the animals to other habitat is feasible. Upon a negative determination, the surface disturbing activity should be relocated to avoid the affected area. (#19)

* * *

M-12. All fluid-holding pits should be constructed or safeguarded to protect wildlife from entrapment or polluted water. (Operational measure to be included in NTL-6 Plan).

WILD HORSE & BURRO

No drilling or storage facilities should be allowed within 1,320 feet of the springs located as shown in column 10 of the impact matrix. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with concurrance of the District Manager, BLM. (#10)

* * *

M-12. All fluid-holding pits should be constructed or safeguarded to protect wild horses and burros from entrapment or polluted water. (Operational measure to be included in NTL-6 plans)

HUMAN VALUES

VISUAL RESOURCE MANAGEMENT

No access or work trail or road, earth cut or fill, structure or other improvement, other than an active drilling rig, should be permitted if it can be viewed from the Scenic Loop Road and the Red Rock Vista. (#1)

No occupancy or other activity should be allowed on the surface of Class I areas and high visual vulnerability zones as shown on the Visual Vulnerability Map.

To maintain aesthetic values, all semi-permanent and permanent facilities should be painted or camouflaged to blend with the natural surroundings. The paint selection or method of camouflage will be subject to approval in writing by the District Engineer, USGS, with concurrence of the District Manager, BLM. (#15)

To maintain aesthetic values and sightseeing opportunities within the RRCRL, no drilling rig should be closer than two miles from the next nearest drilling rig. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#20)

No on-site, above ground storage of extracted minerals, water, or other materials in excess of 500 gallons should be allowed except during exploratory drilling. All mineral, water, or other materials should be removed from the site via buried pipeline or contained in below-ground storage tanks. (#21)

All cut or fill slopes for permanent or semi-permanent facilities should be graded to blend with the adjacent topography. All cut or fill slopes should be seeded and or planted with native or indigenous plant materials within the current or next growing season. (#22)

RECREATION

No occupancy or other activity should be allowed on developed or master-planned facilities as shown on the Recreation Use and Opportunities Map. (#2)

No occupancy or other surface disturbance should be allowed within 1,320 feet of any developed or master-planned facilities as shown on the Recreation Use and Opportunities Map. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#7)

The Scenic Loop Road, the Sandstone Quarry Road, the Whiterock Spring Road, the Rocky Gap Road from Willow Springs to the junction with the Summit Road, the Oak Creek Road, and the First Creek Road should not be used as access roads for oil and gas activities. (#14)

* * *

M-13. Blasting should not be allowed on weekends within 1,320 feet of developed recreation facilities. (Operational measure to be included in NOI and NTL-6 plans)

M-14. All internal combustion engines operating within 1,320 feet of existing developed recreation sites should be muffled so as to give a reading of no more than 86 decibels when measured 50 feet from the source. (Operational measure to be included in NTL-6 plans)

M-15. All lighting, with the exception of aircraft warning lights, should be directional or shaded to preclude observation of the light beyond a 500-foot radius of the light, when safety requirements can be met. (Operational measure to be included in NTL-6 plans)

CULTURAL RESOURCES

No occupancy or other activity should be allowed on the surface at actual or potential nominees to the National Register of Historic Places as shown on the Cultural Resource Site and Archaeological Sensitivity Map. (#2)

The lessee should, prior to operations, furnish to the District Manager, BLM, a certified statement that either no archaeological values exist or that they may exist on the leased lands to the best of the lessee's knowledge and belief and that they might be impaired by oil and gas operations. Such certified statement should be completed by a qualified archaeologist acceptable to the District Manager, BLM. If the lessee furnishes a statement that archaeological values may exist where the land is to be disturbed or occupied, the lessee should engage a qualified archaeologist, acceptable to the District Manager, BLM, to survey and salvage, in advance of any operations, such archaeological values on the lands involved. The responsibility for the cost for the certificate, survey, and salvage should be borne by the lessee, and such salvaged property should remain the property of the lessor or surface owner. (#16)

WILDERNESS

Until the BLM determines that the lands covered by the leases do not meet the criteria for a wilderness study area as set forth in section 603, or until Congress decides against the designation of lands included within the leases as "wilderness," the following conditions should apply to the leases, and override every other provision of the leases which could be considered as inconsistant with them and which deal with operations and rights of the lessee:

1. Any oil or gas activity conducted on the leasehold for which a surface use plan is not required under NTL-6 (for example: geophysical and seismic operations) should be conducted only after the lessee first secures the consent of the BLM. Such consent should be given if BLM determines that the impact caused by the activity will not impair the area's wilderness characteristics.

2. Any oil and gas exploratory or development activity conducted on the leasehold which is included within a surface use plan under NTL-6 should be subject to regulation (which may include no occupancy of the surface) or, if necessary, disapproval until the final determination is made by Congress to either designate the area as wilderness or remove the section 603 restrictions.

If all or any part of the area included within the leasehold estate is formally designated by Congress as wilderness, oil and gas exploration and development operations taking place or to take place on that part of the lease should become subject to the provisions of the Wilderness Act of 1964 which apply to national forest wilderness areas, 16 U.S.C. Sec. 1131 <u>et seq</u>., as amended, the Act of Congress designating the land as wilderness, and Interior Department regulations and policies pertaining thereto. (#17)

LAND USE

No occupancy or other surface disturbance should be allowed within 1,320 feet of Spring Mountain Ranch, Bonnie Spring Ranch, Old Nevada, Mountain Springs, Calico basin, Blue Diamond, and the Frontier Girl Scout Camp. This distance may be modified when specifically appproved by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#8)

No occupancy or other activity should be allowed on the Pine Creek Research Natural Area withdrawn under PLO 3530. (#2)

No drilling or storage facilities should be allowed within 300 feet of any paved road, highway, or above- and below-ground utility lines. This distance may be modified when specifically approved in writing by the District Engineer, USGS, with the concurrence of the District Manager, BLM. (#11)

New roads constructed for oil and gas development and production should be closed to public use. Existing roads currently closed to the public that are used for oil and gas activities should remain closed to the public for similar reasons. (#23)

Transportation of oil and gas products from developed sites within the proposed rights-of-way corridor should be by truck only. (#24)

Pending disposition of the State of Nevada R&PP application N-7293, no occupancy or other activity should be allowed on lands encompassed by the application. Upon final disposition of the application, the District Manager, BLM, should advise the district Engineer, USGS, and the lessee, in writing, if and at what location oil and gas activities may commence. (#3)

* * *

M-16. No oil and gas exploration, development or production should occur within the proposed right-of-way corridor without prior coordination with right-of-way holders. (Operational Measure to be included in the NTL-6 plan)

M-17. No surface or subsurface blasting should be allowed within 300 feet of above-or below-ground utility lines. (Operational measure to be included in NOI)

RESOURCE RELATIONSHIPS

No additional mitigating measures are required over what has been delineated under specific resource uses.

MITIGATING MEASURES MATRIX

T. 20S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
8	NE¼			M6			17														16			
	NW¼			M6			17														16			
	SW¼			M6			17																	
	SE¼			M6			17														16			
9	NE¼			M6			17																	
	NW¼			M6			17																	
	SW¼	12	12	M6			17																	
	SE¼			M6			17																	
10	NE¼	12	12	M6			17																	
	NW¼			M6			17																	
	SW¼	12	12	M6			17																	
	SE¼	12	12	M6			17																	
11	NE¼	12	12	M6			17																	
	NW¼	12	12	M6			17																	
	SW¼	12	12	M6			17																	
	SE¼	12	12	M6			17																	
12	NE¼	12	12	M6			17																	
	NW¼	12	12	M6			17																	
	SW¼	12	12	M6			17																	
	SE¼			M6			17																	
13	NE¼	12	12	M6			17		2															
	NW¼			M6			17		2															
	SW¼	12	12	M6			17		2															
	SE¼	12	12	M6			17		2															
14	NE¼	12	12	M6			17		2															
	NW¼	12	12	M6			17		2					20										
	SW¼			M6			17		2					20										
	SE¼			M6			17		2															
15	NE¼	12	12	M6			17		2															
	NW¼	12	12	M6			17		2															
	SW¼	12	12	M6			17		2				2											
	SE¼	12	12	M6			17		2				2											

MITIGATING MEASURES MATRIX

T. 20S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
16	NE¼	12	12	M6			17		2															
	NW¼	12	12	M6			17		2															
	SW¼	12	12	M6			17		2															
	SE¼	12	12	M6			17		2					20										
17	NE¼			M6			17		2															
	NW¼			M6			17		2															
	SW¼			M6			17		2															
	SE¼	12	12	M6			17		2															
18	NE¼			M6			17		2															
	NW¼			M6			17		2															
	SW¼	12	12	M6			17		2															
	SE¼			M6			17		2															
19	NE¼		12	M6			17		2															
	NW¼			M6			17		2															
	SW¼			M6			17		2															
	SE¼			M6			17		2															
20	NE¼	12	12	M6			17		2															
	NW¼			M6			17		2															
	SW¼	12	12	M6			17		2				2											
	SE¼	12	12	M6			17		2				2											
21	NE¼	12	12	M6			17		2				2	20										
	NW¼	12	12	M6			17		2				2											
	SW¼	12	12	M6			17		2				2											
	SE¼			M6			17		2				2											
22	NE¼	12	12	M6		9	17		2				2											
	NW¼	12	12	M6		9	17		2				2											
	SW¼			M6			17		2				2	20					7					
	SE¼	12	12	M6			17		2				2	20										
23	NE¼	12	12	M6			17		2															
	NW¼			M6			17		2															
	SW¼	12	12	M6			17		2				2			7		7	7					
	SE¼			M6		9	17		2							7	2	2	7	2	16			

MITIGATING MEASURES MATRIX

T. 20S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
24	NE¼	12	12	M6			17		2															
	NW¼			M6			17		2												16			
	SW¼			M6			17		2							7	2	2	7	2	16			
	SE¼			M6			17		2							7			7	2	16			
25	NE¼			M6		9	17		2							7	2	2	7	2	16			
	NW¼			M6			17		2							7	2	2	7	2	16			
	SW¼	12	12	M6			17		2							7		7	7					
	SE¼	12	12	M6			17		2							7			7					
26	NE¼	12	12	M6			17		2				2							2	16			
	NW¼	12	12	M6			17		2				2						7					
	SW¼			M6			17		2				2						7					
	SE¼	12	12	M6			17		2				2											
27	NE¼	12	12	M6			17		2				2	20				7	7					
	NW¼	12	12	M6			17		2				2	20				7	7					
	SW¼			M6			17		2				2		2		2	2	7	2	16			
	SE¼	12	12	M6			17		2				2						7					
28	NE¼			M6			17		2											2	16			
	NW¼			M6			17		2											2	16			
	SW¼	12	12	M6			17		2				2							2	16			
	SE¼	12	12	M6		9	17		2				2		2		2	2	7	2	16			
29	NE¼			M6		9	17		2							7			7	2	16			
	NW¼	12	12	M6			17		2							7			7	2	16			
	SW¼			M6			17		2					20		7			7	2				
	SE¼			M6			17		2							7	2	2	7	2	16			
30	NE¼	12	12	M6			17		2				2	20						2				
	NW¼	12	12	M6			17		2											2				
	SW¼	12	12	M6			17		2				2	20						2				
	SE¼	12	12	M6			17		2				2							2				
31	NE¼			M6			17		2					20					7	2				
	NW¼	12	12	M6			17		2				2							2				
	SW¼	12	12	M6	5		17		2				2	20					7	2				
	SE¼			M6	5	9	17		2					20		7	2	7	7	2	16			

MITIGATING MEASURES MATRIX

T. 20S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
32	NE¼	12	12	M6			17		2							7	2	2	7	2	16			
	NW¼			M6			17		2							7	2	2	7	2	16			
	SW¼			M6			17		2							7	2	2	7	2	16			
	SE¼	12	12	M6	5		17	6	2					20	2	7	2	2	7	2	16			
33	NE¼			M6		9	17		2				2					7	7	2	16			
	NW¼	12	12	M6			17		2				2							2	16			
	SW¼	12	12	M6	5	9	17		2				2	20	2		2	2	7	2	16			
	SE¼			M6			17		2				2	20	2		2	2	7	2	16			
34	NE¼			M6			17		2				2		2		2	2	7					
	NW¼			M6	5		17		2				2		2		2	2	7	2				
	SW¼			M6	5		17		2				2		2		2	2	7					
	SE¼			M6	5								2		2		2	2	7					
35	NE¼			M6			17		2				2	20	2			2	7	2	16			3
	NW¼			M6			17		2				2		2		2	2	7					3
	SW¼			M6			17						2		2		2	2	7	2	16			
	SE¼			M6	5		17		2				2	20	2		2	2	7	2	16			3
36	NE¼	12	12	M6			17		2															3
	NW¼	12	12	M6			17		2				2					7	7					3
	SW¼	12	12	M6			17		2				2	20	2	7			7					3
	SE¼			M6			17		2				2	20					7	2	16			3
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							

MITIGATING MEASURES MATRIX

T. 21S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
1	NE¼	12	12	M6		9			2				2	20	2			2	7				8	3
	NW¼			M6					2				2	20	2		2	2	7					3
	SW¼			M6		9				19			2				2	2	7					
	SE¼			M6					2	19			2	20	2		2	2	7	2	16		8	3
2	NE¼			M6	5				2				2		2		2	2	7					
	NW¼			M6									2						7					
	SW¼			M6	5				2				2						7					
	SE¼			M6	5				2				2											
3	NE¼			M6	5				2				2											
	NW¼			M6									2	20	2		2	2	7					
	SW¼			M6	5		17		2				2		2		2	2	7					
	SE¼			M6	5				2				2		2				7					
4	NE¼			M6	5		17		2				2	20	2		2	2	7					
	NW¼			M6	5	9	17	6	2				2		2		2	2	7	2	16			
	SW¼	12	12	M6			17		2				2	20	2						16			
	SE¼			M6	5		17		2				2		2		2	2	7		16			
5	NE¼	12	12	M6			17		2				2	20	2				7					
	NW¼	12	12	M6			17		2				2											
	SW¼			M6			17		2				2											
	SE¼	12	12	M6			17		2				2											
6	NE¼			M6			17		2					20		7			7	2	16			
	NW¼			M6			17		2							7	2	7	7	2	16			
	SW¼			M6			17		2							7	2	7	7	2	16			
	SE¼			M6			17		2											2	16			
7	NE¼			M6			17		2							7			7					
	NW¼			M6		9	17		2								2	7	7					
	SW¼			M6			17		2										7					
	SE¼			M6			17		2				2											
8	NE¼	12	12	M6			17		2					20										
	NW¼			M6		9	17		2					20										
	SW¼			M6			17		2				2											
	SE¼	12	12	M6			17		2				2											

MITIGATING MEASURES MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
9	NE¼	12	12	M6			17		2				2						7					
	NW¼	12	12	M6			17		2				2						7					
	SW¼	12	12	M6			17		2			2	2											
	SE¼			M6			17		2				2					7	7					
10	NE¼			M6	5		17		2				2		2		2	2	7					
	NW¼			M6									2		2		2	2	7					
	SW¼			M6			17						2		2		2	2	7					
	SE¼			M6			17						2						7					
11	NE¼			M6	5				2	19			2											
	NW¼			M6	5				2	19			2		2				7					
	SW¼			M6					2	19			2											
	SE¼			M6	5				2	19			2											
12	NE¼			M6						19			2		2		2	2	7	2	16			3
	NW¼			M6	5					19			2											
	SW¼			M6	5				2	19			2											
	SE¼			M6	5				2	19			2		2		2	2	7			11		3
13	NE¼			M6	5	9			2	19			2		2		2	2	7					3
	NW¼			M6	5				2	19			2		2		2	2	7					
	SW¼			M6	5					19			2		2		2	2	7					
	SE¼			M6	5					19			2		2		2	2	7					3
14	NE¼			M6	5					19			2											
	NW¼			M6	5					19			2						7					
	SW¼			M6	5		17		2	19			2		2		2	2	7					
	SE¼			M6	5				2	19			2		2		2	2	7					
15	NE¼			M6	5			6	2	19			2		2		2	2	7					
	NW¼			M6	5			6	2	19			2		2		2	2	7	2	16			
	SW¼			M6	5		17		2	19			2	20										
	SE¼			M6	5		17		2	19			2		2			2	7					
16	NE¼			M6	5		17	6	2			2	2		2		2	2	7	2	16			
	NW¼			M6			17	6	2			2	2	20	2		2	2	7	2	16			
	SW¼	12	12	M6		9	17		2			2	2		2			2	7					
	SE¼			M6			17		2				2		2			2	7					

MITIGATING MEASURES MATRIX

T. 21S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
17	NE¼	12	12	M6		9	17	6	2			2	2	20									2	
	NW¼	12	12	M6			17		2			2	2	20									2	
	SW¼	12	12	M6			17		2			2	2	20										
	SE¼	12	12	M6			17		2			2	2		2			2	7					
18	NE¼			M6			17		2			2		20										
	NW¼			M6			17		2									7	7					
	SW¼			M6			17		2				2					7	7					
	SE¼	12	12	M6			17		2			2	2	20										
19	NE¼	12	12	M6			17		2			2		20					7					
	NW¼			M6			17											7	7					
	SW¼			M6			17											7	7					
	SE¼	12	12	M6			17		2									7	7					
20	NE¼	12	12	M6		9	17		2			2	2											
	NW¼	12	12	M6			17		2			2												
	SW¼	12	12	M6			17		2					20										
	SE¼	12	12	M6			17		2					20					7					
21	NE¼			M6			17		2				2					7	7					
	NW¼			M6			17		2				2											
	SW¼	12	12	M6			17	6	2				2		2			2	7		16			
	SE¼			M6			17	6	2				2		2		2	2	7		16			
22	NE¼			M6			17			19			2	20										
	NW¼			M6			17			19				20										
	SW¼			M6	5		17	6	2	19				20	2			2	7		16			
	SE¼			M6	5		17		2	19				20										
23	NE¼			M6						19			2	20	2		2	2	7					
	NW¼			M6			17			19			2		2		2	2	7					
	SW¼			M6			17	6		19				20	2		2	2	7					
	SE¼			M6						19			2	20					7					
24	NE¼																							
	NW¼			M6						19			2											
	SW¼			M6						19			2											
	SE¼																							

MITIGATING MEASURES MATRIX

T. 21S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
25	NE¼																							
	NW¼			M6						19			2	20										
	SW¼	12	12	M6						19			2											
	SE¼																							
26	NE¼			M6						19				20					7					
	NW¼			M6	5		17		2	19				20	2		2	2	7					
	SW¼			M6	5		17			19					2		2	2	7					
	SE¼			M6						19			2	20					7					
27	NE¼			M6	5		17			19				20	2		2	2	7					
	NW¼			M6			17		2	19			2	20	2		2	2	7					
	SW¼			M6			17			19			2					7	7					
	SE¼			M6			17			19				20	2		2	2	7					
28	NE¼	12	12	M6			17	6	2				2		2		2	2	7					
	NW¼	12	12	M6			17		2				2											
	SW¼	12	12	M6			17		2				2						7					
29	SE¼	12	12	M6			17		2				2											
	NE¼	12	12	M6			17		2					20										
	NW¼	12	12	M6			17		2					20					7					
	SW¼			M6			17		2									7	7					
	SE¼	12	12	M6			17		2					20										
30	NE¼			M6			17											7	7					
	NW¼			M6		9	17																	
	SW¼			M6			17																	
	SE¼			M6			17												7					
31	NE¼			M6			17																	
	NW¼			M6			17																	
	SW¼			M6			17																	
	SE¼			M6			17																	
32	NE¼	12	12	M6			17		2					20					7					
	NW¼			M6			17											7	7					
	SW¼			M6			17											7	7					
	SE¼	12	12	M6			17		2					20					7					

MITIGATING MEASURES MATRIX

T. 21S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
33	NE¼	12	12	M6		9	17	6	2		10		2			7		7			16			
	NW¼	12	12	M6			17	6	2					20							16			
	SW¼	12	12	M6			17		2				2	20										
	SE¼	12	12	M6			17		2				2						7					
34	NE¼			M6	5		17		2	19			2	20		7		7			16			
	NW¼			M6			17		2	19			2			7		7	7		16			
	SW¼			M6			17	6	2	19			2					7	7					
	SE¼			M6			17			19			2	20			2	7	7					
35	NE¼			M6	5					19				20	2				7		16			
	NW¼			M6	5		17		2	19				20	2	7	2	2	7		16			
	SW¼																							
	SE¼			M6	5					19				20	2		2	2	7					
36	NE¼																							
	NW¼	12	12	M6						19				20										
	SW¼	12	12	M6						19				20					7					
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							

MITIGATING MEASURES MATRIX

T. 22S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
1	NE¼			M6						19				20					7				8	
	NW¼			M6	5					19				20	2		2	2	7		16	11	8	
	SW¼																					11	8	
	SE¼			M6	5					19					2		2	2	7		16	11	8	
2	NE¼			M6	5	9	17			19	10			20	2			2	7		16	11	8	
	NW¼			M6	5	9	17			19	10		2	20	2			7	7			11		
	SW¼			M6	5	9	17			19	10		2	20	2		2	7	7					
	SE¼			M6	5		17			19				20	2		2	7	7		16			
3	NE¼																							
	NW¼	12	12	M6		9	17		2	19	10		2		2		2		7					
	SW¼	12	12	M6		9	17		2	19	10		2		2		2		7		16			
	SE¼			M6		9	17		2	19	10		2		2			7	7		16			
4	NE¼	12	12	M6			17		2				2	20					7					
	NW¼	12	12	M6			17		2					20										
	SW¼	12	12	M6			17		2															
	SE¼	12	12	M6			17	6	2					20					7					
5	NE¼	12	12	M6		9	17		2		10								7					
	NW¼			M6			17											7	7		16			
	SW¼			M6			17		2										7		16			
	SE¼	12	12	M6		9	17		2		10							7	7					
6	NE¼			M6			17														16			
	NW¼			M6			17																	
	SW¼			M6			17		2												16			
	SE¼			M6		9	17				10										16			
7	NE¼			M6		9	17		2		10								7					
	NW¼			M6			17		2												16			
	SW¼			M6			17												7		16			
	SE¼			M6			17												7		16			
8	NE¼	12	12	M6			17		2									7	7					
	NW¼			M6			17		2										7		16			
	SW¼			M6			17												7		16			
	SE¼			M6			17		2										7					

MITIGATING MEASURES MATRIX

T. 22S

R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
9	NE¼	12	12	M6		9	17		2		10		2	20										
	NW¼	12	12	M6			17		2					20										
	SW¼	12	12	M6			17		2					20										
	SE¼	12	12	M6			17		2				2	20										
10	NE¼			M6			17		2	19			2	20				7	7					
	NW¼	12	12	M6		9	17		2		10		2	20					7					
	SW¼	12	12	M6			17		2				2											
	SE¼			M6			17		2				2					7	7					
11	NE¼			M6	5		17			19				20			2	7	7				8	
	NW¼			M6	5		17		2	19				20			2		7					
	SW¼			M6			17		2	19				20				7	7					
	SE¼			M6			17			19				20			2	7	7					
12	NE¼			M6	5					19				20	2		2	7	7		16	11	8	
	NW¼			M6	5	9			2	19	10			20				7	7		16		8	
	SW¼	12	12	M6						19			2						7					
	SE¼			M6						19				20										
13	NE¼			M6						19														
	NW¼			M6						19						7	2	7	7					
	SW¼			M6	5		17			19				20		7	2	7	7					
	SE¼			M6						19														
14	NE¼			M6			17			19						7	2	7	7					
	NW¼			M6			17		2	19				20		7	2	7	7					
	SW¼			M6		9	17		2	19	10			20		7	2	7	7		16			
	SE¼			M6	5		17		2	19						7	2	7	7		16			
15	NE¼			M6			17		2					20					7					
	NW¼	12	12	M6			17	6	2															
	SW¼	12	12	M6		9	17		2		10			20										
	SE¼			M6		9	17		2		10			20					7					
16	NE¼	12	12	M6		9	17		2		10													
	NW¼	12	12	M6			17		2					20					7					
	SW¼	12	12	M6			17		2									7	7					
	SE¼	12	12	M6			17		2															

MITIGATING MEASURES MATRIX

T. 22S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
17	NE¼	12	12	M6		9	17		2		10							7	7					
	NW¼			M6			17														16			
	SW¼			M6			17														16			
	SE¼	12	12	M6			17		2										7					
18	NE¼			M6			17														16			
	NW¼			M6			17														16			
	SW¼			M6			17														16			
	SE¼			M6			17														16			
19	NE¼			M6		9																		
	NW¼																							
	SW¼																							
	SE¼																							
20	NE¼			M6			17		2									7	7		16		8	
	NW¼																							
	SW¼					9																		
	SE¼																							
21	NE¼	12	12	M6			17		2															
	NW¼	12	12	M6			17		2									7	7				8	
	SW¼	12	12	M6			17		2				2					7	7				8	
	SE¼	12	12	M6			17		2									7	7					
22	NE¼			M6			17		2									7	7	2	16			
	NW¼	12	12	M6			17		2															
	SW¼	12	12	M6			17		2										7	2	16			
	SE¼			M6		9	17		2		10							7	7	2	16			
	NE¼			M6			17		2	19				20		7	2	7	7	2	16			
	NW¼			M6		9	17		2	19	10					7	2	7	7	2	16			
	SW¼			M6			17			19						7	2	7	7					
	SE¼			M6			17			19						7			7					
24	NE¼			M6						19				20					7					
	NW¼			M6			17			19				20		7	2	7	7					
	SW¼			M6			17		2	19				20		7	2	7	7			11		
	SE¼			M6					2	19				20	2	7	2		7			11		

MITIGATING MEASURES MATRIX

T. 22S
R. 58E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
25	NE¼			M6					2	19				20	2	7			7			11		
	NW¼			M6	5		17			19				20	2	7	2	7	7		16	11		
	SW¼			M6	5									20								11		
	SE¼			M6					2					20								11		
26	NE¼			M6	5		17		2					20	2	7	2	7	7			11		
	NW¼			M6	5		17									7	2	7	7					
	SW¼			M6	5		17		2					20		7	2	7	7					
	SE¼			M6	5				2					20	2	7	2	7	7		16	11		
27	NE¼			M6			17		2					20				7	7			11		
	NW¼	12	12	M6			17		2													11	8	
	SW¼	12	12	M6			17		2					20	2			7	7			11	8	
	SE¼			M6			17		2					20				7	7			11		
28	NE¼	12	12	M6			17		2					20				7	7					
	NW¼			M6			17		2					20	2		2	7	7					
	SW¼	12	12	M6					2					20	2		2	7	7					
	SE¼	12	12	M6					2					20	2		2	7	7					
33	NE¼			M6					2					20	2	7	2		7			11		
	NW¼	12	12	M6					2					20					7			24		
	SW¼			M6					2													24		
	SE¼			M6					2					20							16	24		
34	NE¼			M6	5		17		2					20	2		2	7	7			11		
	NW¼			M6	5		17		2					20	2	7	2	7	7		16	11		
	SW¼			M6					2					20							16	24		
	SE¼			M6										20								24		
35	NE¼			M6	5									20		7	2		7			11		
	NW¼			M6	5									20	2	7	2	7	7			11		
	SW¼			M6										20								24		
	SE¼			M6										20		7	2		7			24		
36	NE¼	12	12	M6																		24		
	NW¼			M6										20								24		
	SW¼	12	12	M6																		24		
	SE¼	12	12	M6																		24		

MITIGATING MEASURES MATRIX

T. 20S

R. 59E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
7	NE¼	12	12	M6			17																	
	NW¼	12	12	M6			17																	
	SW¼			M6			17																	
	SE¼			M6			17																	
18	NE¼			M6			17									7			7					
	NW¼			M6			17																	
	SW¼	12	12	M6			17																	
	SE¼	12	12	M6			17									7			7					
19	NE¼	12	12	M6			17																	
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
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	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							

MITIGATING MEASURES MATRIX

T. 21S

R. 59E

SEC	SUB DIV	1-Topography	2-Soils	3-Soils	4-Water	5-Water	6-Wilderness	7-Vegetation	8-Wildlife	9-Wildlife	10-W.H.&B.	11-V.R.M.	12-V.R.M.	13-V.R.M.	14-Recreation	15-Recreation	16-Recreation	17-Recreation	18-Recreation	19-Cultural Res.	20-Cultural Res.	21-Land Use	22-Land Use	23-Land Use
5	NE¼																							
	NW¼																							
	SW¼			M6	5					19				20										
	SE¼																							
6	NE¼																							
	NW¼																							
	SW¼			M6		9			2				2	20	2		2	2	7					3
	SE¼			M 6		9								20	2				7					
7	NE¼			M6						19			2	20			2	2	7				8	
	NW¼			M6		9			2	19			2	20					7				8	
	SW¼			M6	5					19			2	20	2		2	2	7					
	SE¼			M6	5				2	19			2	20	2		2	2	7					
8	NE¼			M6										20										
	NW¼			M6	5				2	19				20	2		2	2	7					
	SW¼	12	12	M6	5				2	19			2	20										
	SE¼	12	12	M 6										20										
18	NE¼			M6	5								2	20										
	NW¼			M6	5								2	20										3
	SW¼			M6									2											3
	SE¼			M6									2											
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							
	NE¼																							
	NW¼																							
	SW¼																							
	SE¼																							

ALTERNATIVE 1 - NO ACTION

None

CHAPTER 6

UNAVOIDABLE ADVERSE IMPACTS

UNAVOIDABLE ADVERSE IMPACTS

PROPOSED ACTION

Air Quality

None

Soils

Any surface disturbance will cause some soil compaction and accelerated erosion. This could involve up to 160 acres during preliminary investigation and up to 400 acres during exploration, development, and production phases.

Topography

Recontouring of slopes and restoration of natural drainages can only attempt to blend with adjacent landforms. It can not totally obviate the impacts of this project. The degree to which the mitigating measures are successful will vary with the particular site.

Water Resources

In spite of conscientiously-applied mitigating measures, some impacts on the water resources of the RRCRL may occur.

Erosion on disturbed areas, involving up to 560 acres, is likely to occur during the interim between the initial site disturbance and the subsequent stabilization required of the lessee. The extent of such erosion is not predictable. The erosion will be concentrated in the exploration and early development phases.

Damage to the ground water system could be significant in the event of a well blowout or communication between acquifers. However, such an occurance is not likely given stringent operating standards.

Vegetation

Vegetation on up to 560 acres would be lost due to the destruction of plant cover initially by the construction of drill pads, roads, seismographic lines, drainage crossing, pipelines, and other structures. Assuming that 20% of the 35 wells (7 wells) were put into production, then 44 acres of vegetation would be eliminated through the term of the wells' production and until the sites could be rehabilitated. A lesser impact would occur to off-site vegetation, i.e., vegetation immediately adjacent to the disturbed area. Impacts to this vegetation would be in the form of competition from species which invade disturbed areas, loss of habitat from erosion, soil compaction, or from injury to vegetation from mechanical equipment.

Severe loss of vegetation could occur as a result of accidental blowouts of wells, fires, and spills of salt water or caustic solutions. Mitigating measures and cleanup plans should minimize the extent of such impacts. However, when these situations occur on large areas, vegetation can be lost for periods ranging from one to several years in the case of fires or oil spills in easily-regenerated environments, to 25 to 100 years in the case of soil sterilization.

Wildlife

The most important wildlife habitat in the RRCRL would be protected if the mitigating measures outlined earlier are followed. Construction of drilling pads, roads, seismographic lines, and other structures would eliminate up to 560 acres of habitat that supports wildlife. That loss would continue until such areas are rehabilitated. Many small animals would die when heavy equipment destroys natural communities. Road kills would be another source of animal loss. Accidental spills of oil or other toxic substances would kill additional animals and destroy additional habitat. Major accidents such as a well blowout or fire could do signifiacnt harm to wildlife habitat, or destroy it entirely. Concentrated development and human activity associated with oil and gas wells can still render undisturbed areas around wells useless to some wildlife species intolerant of such activity.

Wild Horse and Burro

None

Visual Resource Management

Some loss of scenic values will occur within the RRCRL regardless of how concientiously applied are the mitigating measures for visual imapcts associated with each phase of oil and gas operations. It is practically impossible to forecast all the impacts and implement technically sound and feasible mitigating measures. Some of the visual impacts will only occur for a short period of time. However, during that period the character of the RRCRL will be changed. Sightseeing will be negatively impacted by any change in the pristine character of portions of the RRCRL, decreasing over an extended period of time as natural processess restore the impacted areas. Some sites in lower portions of the RRCRL may never recover.

Recreation

With the recommended mitigating measures, direct adverse impacts remaining would occur only to those dispersed forms of recreation such as hiking, horseback riding, and camping where placement of a drilling rig would preclude use of that site for those recreational uses.

While the mitigating measures will do much to mask the indirect impacts of oil and gas operations on the recreationist, the introduction of an industrial element into an otherwise natural setting will continue to be observable. To a greater or lesser degree, therefore, depending on the perceptive ability of each recreationist, sights, sounds, and smells related to the oil and gas operations will continue to intrude on the recreational experience, reducing the current natural quality of the recreational values in the RRCRL. These impacts would be visual intrusions, noises, odors, road dust, and fugitive light.

New oil and gas operation service roads into the backcountry west of the escarpment would increase access, which could be a positive factor for some recreationists such as hunters. To others, such as campers, climbers, and backpackers seeking the solitude of a wilderness experience, this would be a negative factor. Increased use of existing back country roads would increase traffic hazards and reduce recreational quality.

Additional traffic on West Charleston Boulevard from oil and gas operations could discourage bicylists, joggers, and sightseers. It could also pose a traffic hazard to Spring Mountain Ranch State Park visitors at the entrance to the park on the boulevard. Oil and gas related traffic on Brownstone Canyon Road would pose traffic hazards and reduce recreation quality in the vicinity of the road.

Cultural Resources

In the event new archaeological sites are discovered in the wake of oil and gas operations, the survey or salvage options under the mitigating measure could result in less than 100% of the site being recovered. The unmitigated adverse impact would be the loss of the remaining cultural resource to oil and gas operations and the inability to apply future, improved archaeological techniques to better interpret the cultural material. Improved access to some archaeological areas, such as Brownstone Canyon, could lead to increased vandalism of cultural material.

Wilderness

During the term of the project, negative impacts to wilderness values are expected. These are temporary and, therefore, acceptable according to the Interim Management Policy for Lands under Wilderness Review. However, unavoidable adverse impacts to wilderness characteristics may occur as a result of any unexpected inability to complete the proposed reclamation at the end of the oil and gas activities.

Socio-Economic

Although many adverse impacts can be mitigated, many Las Vegans would perceive that the natural recreational opportunities in the RRCRL would be nontheless reduced. A BLM program to explain the rationale for its decision may not offset local opposition to the perceived negative impact on the recreational values of RRCRL. This could result in various forms of protest of the BLM decision by public and private groups.

Land Use

Unmitigated adverse impacts would be associated primarily with the residential and recreational developments in and adjacent to the RRCRL. Development of oil and gas would have a minor effect on the residential "climate" in Calico Basin, Mountain Springs, and near the Oliver Ranch. Prohibiting activities with 1,320 feet of these residential areas will offset most of the adverse effects, but some minor degradation would occur. Correspondingly, property values of homes and undeveloped lots may drop slightly.

The volume of recreational use at Spring Mountain Ranch, Bonnie Spring Ranch, and Old Nevada may be curtailed somewhat. Visitors to these areas may visualize oil and gas facilities such as drill rigs and storage facilities as inharmonious with the recreation experience they seek. In the opinion of the owner of Bonnie Springs Ranch, visitor use of his recreation area may decrease to the point where it is no longer profitable to remain in operation. Should this occur the owner will most likely shut down his operation, thereby eliminating a form of recreational land use now available in RRCRL.

Resource Relationships

To the extent that impacts to values such as vegetation and visual resources are successfully mitigated, no degradation occurs to the relationship. Should mitigation not take place, or fail, then the relationships could be seriously degraded with significant losses to human recreational experiences likely.

ALTERNATIVE 1—NO ACTION

The impacts described in Chapter 3 for this alternative cannot be mitigated and are therefore unavoidable adverse impacts.

CHAPTER 7

SHORT TERM USE VS LONG TERM PRODUCTIVITY

SHORT TERM USE VS. LONG TERM PRODUCTIVITY

PROPOSED ACTION

The short term use under the proposed action is the leasing of oil and gas mineral rights within the RRCRL and the subsequent exploration for and development of oil and gas reserves within the study area. The short term could end with preliminary investigation phase revealing no subsurface structure likely to capture and hold oil and gas. In that case the short term use could last little more than a year or two with minimal impact on non-mineral resources. The short term could also last into the exploration phase, ending when exploratory wells indicate no oil and gas present in subsurface reservoirs. This term could last for several years and involve significant surface disturbance at the sites of the exploratory wells. At the extreme, if an economic field of oil or gas should be discovered within the RRCRL, the short term could last up to 25 years after discovery, the assumed life of the field for this study.

The long term productivity is best measured by the time it would take native vegetation to be reestablished within disturbed surface areas when the short term uses last for the 25-year life of the field. Under the spartan climatic conditions present in the RRCRL this may be as long as 50 years after the end of the short term.

<u>Soils</u>

Short term use of the soil would probably result in some compaction and churning of the soil at the disturbed sites. Long term productivity of truncated soils could be moderately to severely degraded, depending on the soil type. However, proper stockpiling of removed soil during operations and replacement during rehabilitation should eliminate the threat to long term productivity of the soil by the short term use.

<u>Water Resources</u>

Any degradation of the water resources by normal oil and gas activities is usually short-lived. Surface disturbance and erosion will be concentrated during the exploration and early development phases and again during the abandonment phase. Little erosion is expected during the production phase, after the site has been stabilized, or following the first reclamation procedures.

Long term productivity of surface water resources could be affected by accidents such as unintended discharge of toxic or caustic fluids into surface waters. Down-hole accidents could adversely affect ground water supplies. Poor well abandonment procedures, such as fresh water contamination, could also have long lasting effects. However, the likelihood of such long term threats to productivity is low if strict adherence to proper operating procedures is required by regulating agencies.

Topography

Topography could be radically altered during the short term use period in those areas requiring extensive cut and fill work. However, effective rehabilitation of these areas should restore the basic topography at the conclusion of the short term use so that there are no long term changes.

Geology

The short term recovery and use of any oil and gas reserves existing in RRCRL would deplete a non-renewable resource that could not be regenerated within any forseeable future time frames.

Vegetation

As wells are abandoned, disturbed areas would be revegetated and returned to other uses. However, these sites may not return to the same level of productivity as before oil and gas operations began. Some of the sites could possibly produce more vegetation, and some would undoubtly produce less. In most cases, these disturbed areas would not be the same due to the availability of suitable seed sources, difficulty of re-establishing some of the native species, and changes in soil composition which would permanently affect plant communities and succession. Should the unique vegetation types or threatened or endangered plants be disturbed or destroyed, they would probably never reappear.

Wildlife

Use by animals is greatly dependent upon the vegetation present or the success in reestablishing vegetation. If rehabilitation is unsuccessful, then the long term productivity of wildlife could be reduced. Short term use of the RRCRL during the preliminary investigation phase probably would not impair long term productivity for wildlife. However, follow-on development and production could have an adverse long term effect on wildlife productivity, particularly if important habitats (riparian, bighorn sheep crucial, desert wash) are destroyed as a result of major accidents. Such habitat may never be recovered, resulting in long term loss of key wildlife species. After production and site abandonment, the ecosystems may never be completely rehabilitated. In such cases, the long term productivity of the habitat and the wildlife may be significantly degraded.

Wild Horses and Burros

Long term productivity of wild horses and burros in the RRCRL would not be degraded by the short term uses. Even if there were significant mortality to the current populations as a result of the short term use, more than sufficient opportunities exist to re-populate the area from other existing herds now exceeding the carrying capacity of their habitats.

Visual Resource Management

Oil and gas activities during the preliminary investigation phase would have little effect on the use of the RRCRL as a scenic attraction. All subsequent phases, however, could detract strongly from visitors' sightseeing experience during the short term existence of the phase. This is particularly so in the high visual vulnerability zones, especially the area below the escarpment. Long term use of the RRCRL may be degraded if rehabilitation of surface disturbances is wholly or partly unsuccessful. Again, the degradation of the scenic values would be greatest in the area below the escarpment, where climatic conditions also make rehabilitation failure most likely.

Recreation

To the extent that vegetative rehabilitation would fail, leaving readily discernable scars on the surface of the RRCRL with the accompanying degradation of the naturalness of the area, short term uses would impede the long term productivity of the RRCRL for recreation uses. This would be particularly true in the canyon below the escarpment in areas that could be viewed from the Scenic Loop Road and Red Rock Vista. Similar scars from drill pads in the back country would degrade the long term productivity of recreational uses for such persons as campers, backpackers, and climbers.

Roads developed in association with the oil and gas operations may provide additional access to the backcountry for off-road vehicle users. That would be beneificial for that recreational use but negative for non-motorized recreational uses currently contemplated. In that respect, unrehabilitatable roads would be detrimental to long term recreational productivity.

Long term loss of important wildlife habitat from major accidents or failed rehabilitation could adversely affect the long term productivity of recreational uses that involve wildlife. Hunters would find reduced populations of big game such as bighorn sheep and mule deer; photographers and bird watchers may find reduced populations of their subjects. In any case, that recreational use could suffer a long term productivity loss as a result of the short term oil and gas operations.

Cultural Resource

Were extensive exploration and development to be undertaken, there may be significant amounts of cultural resource survey and salvage work done as a result of discoveries of new archaeological sites. If 100% salvage operations were required, then the short term uses could result in significant increases in data available to help interpret cultural resources within RRCRL. This would represent a long term productivity improvement resulting from the short term use, as funds might not otherwise be available to accomplish that type of work.

If less than 100% salvage operations were accomplished, there could be a long term productivity loss in that no resources to which might be applied future, improved archaeological techniques would be preserved at those site.

Surface disturbance might also destroy the visual intergrity of the locations in which cultural resources are found, resulting in a long term productivity loss.

Wilderness

Impacts to wilderness values during the short term use of the RRCRL for oil and gas activities are expected. The interim management policy directs that any temporary impacts authorized by the BLM under the nonimpairment criteria will be ignored during the wilderness study process, and that the WSA will be considered in its expected condition at the time reclamation is complete. In addition, the Secretary of Interior's recommendation on the area's suitability or nonsuitability will not consider the impacts of any unexpected inability to complete the reclamation by the time of the recommendation. The proposed short term use of the RRCRL will therefore not affect wilderness values. Once the Secretary's recommendation is forwarded to Congress, however, the legislative evaluation of the area's suitability for designation to the National Wilderness Preservation System may include the impacts of incomplete reclamation. It is conceivable that authorized temporary impacts, or reclamation of these impacts that has not been completed at the time of the Congressional evaluation of the area, may result in a decision that the area is unsuitable for wilderness preservation. Wilderness values in that area would no longer be protected and degradation could occur.

Social-Economic

If economical reserves or oil or gas were found in the RRCRL, the short term use could contribute financial benefits to Federal, State and local treasuries. Economic benefits might also accrue to the local economy as a result of the successful oil and gas operations.

This could also have a short term beneficial effect on the national economic and energy situation by reducing, by whatever degree, dependence on foreign oil. It is not likely, however, that it would have any measureable effect either on the long term productivity of the local or national economy or on the national energy crisis. Oil and gas being a non-renewable resource, its productivity is short term.

Should the oil and gas operations end with the preliminary investigation phase, the degradation of the long term productivity of other resources as a result of the short term usė would probably be minimal, if anything.

If the oil and gas operations were to go through the exploration stage without any economical discoveries, there could occur a degradation of long term productivity of other resources, such as vegetation and recreation, without the short term payback of additional energy resources.

A decision to grant oil and gas leases in RRCRL by the BLM, if it cannot be satisfactorily explained and justified to the majority of Las Vegans who might oppose such a decision, may cause short term dissatisfaction with and long term damage to the creditability of the BLM as a management agency in the RRCRL.

Land Use

Throughout the short term use period, the "climate" of the residential acreas in and adjacent to the RRCRL would be slightly affected by oil and gas operations. Visitor use at the recreational areas may be curtailed during this period. The loss of recreation opportunities at Bonnie Spring Ranch could also occur should poor economic outlook force the owner to close down his operation. Over the long term, may of the conflicts would disappear. However, the loss of recreational facilities at Bonnie Spring Ranch could prove long term if they are not reestablished in time to preclude irreprable economic damage to the owner.

Resource Relationships

The short term use for oil and gas operations would certainly affect the resource relationship giving the RRCRL its high recreational values. That might be acceptable to people under a drastic energy crisis, if oil and gas were being produced and helping to moderate the crisis. At the same time the short term use could adversely affect long term productivity by such actions as a well blowout or a failed rehabilitation effort. In many areas, of RRCRL that would be a severe degradation of the resource relationship, particularly in the area below the escarpment between Calico Hills and Spring Mountain Ranch.

CHAPTER 8

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

IRREVERSIBLE AND IRRETRIEVABLE COMMITTMENT OF RESOURCES

Within the non-living components of the environment, only the oil and gas discovered and removed, if any, represents an irretrievable committment of non-renewable resources.

The vegetation lost to oil and gas can, in theory, be replaced by rehabilitation of disturbed sites. However, the growth lost during the period when the site is not producing can never be replaced.

The animals lost to oil and gas activities can, in therory, be replaced by rehabilitating disturbed sites. However, the animals lost during the period of oil and gas operations can never be replaced. Gullying, sedimentation, or other alteration of springs or streams resulting from oil and gas activities could cause irretrievable changes in riparian and aquatic habitat by causing water tables to drop.

Any change in the characteristic landscape of the RRCRL will be visible for many decades. Succession in the low desert is very slow due to the lack of rainfall. Rehabilitation techniques may utilize non-indigenous plant species, changing the character of the area within the RRCRL. The amount of contrast will vary by area, rehabilitation techniques, and the success of those techniques.

All landscapes are unique in their own right and any chage or loss of scenic values is irretrievable. Those losses become more significant in areas of unique or outstanding scenic quality like the Red Rock Canyon Recreation Lands.

Where the quality of recreational values in the RRCRL is lowered as a result of oil and gas activities, particularly as a result of visual Resource losses, several million visitors would suffer reduced recreation experiences during the life of the project. Other potential visitors could be diverted to other areas as a result of lowered recreation expectations in the RRCRL. This type of irretrievable committment would be most prevalent in the areas east of the escarpment where the scenic and sightseeing aspects of the RRCRL experience are most prominent and the corresponding visual impacts would be strongest.

Temporary, negative impacts to wilderness values occuring during oil and gas activities, and as a result of any unexpected inability to complete reclamation following these activities, are reversible until the time of the Secretary's recommendation on the area's suitability for wilderness preservation on October 21, 1991. After this date and during the Congressional evaluation of this recommendation, any remaining impacts may be considered. The area may be judged unsuitable for wilderness preservation based on these residual impacts, and an irretrievable loss of wilderness values may result.

Overall, irretrievable or irreversible committment of many of RRCRL's component elements could well do irremediable damage to the relationship, altering in a downward way the human perception that Red Rocks is a unique geographical setting of particular value to Southern Nevada residents.

CHAPTER 9

PERSONS, GROUPS AND GOVERNMENT AGENCIES CONSULTED

PERSONS, GROUPS, AND GOVERNMENT AGENCIES CONSULTED

A. <u>Federal Government</u>

U. S. Geological Survey
Nevada State Office, BLM, Reno
U. S. Fish and Wildlife Service
Heritage Conservation and Recreation Service
National Park Service

B. <u>State of Nevada</u>

Nevada State Clearing House
Department of Transportation
Department of Wildlife
Division of State Parks
Division of Mineral Resources
Nevada State Museum, Carson City

C. <u>County and Local Governments</u>

Clark County Air Pollution Control Division
Clark County Road Department

D. <u>Miscellaneous Organizations</u>

UNLV Archeological Research Center
Red Rocks Audubon Society
Utah State University

E. <u>Individuals</u>

Betty Burge
Dr. Michael O'Farrell
Al Levinson

CHAPTER 10

INTENSITY OF PUBLIC INTEREST

INTENSITY OF PUBLIC INTEREST

(Autumn 1979) Las Vegas residents have had a long and abiding interest in Red Rock Canyon and the protection of its visual and recreational values. In the town's early days (circ. 1910) the canyon, particularly Spring Mountain Ranch, was a respite from the heat and dust of the Las Vegas Valley floor in the dog-days of summer. Families made regular weekend picnic trips to the ranch an refreshed themselves in the cool orchards then growing there. In autumn the owners of the ranch often opened up the orchards to fruitpickers from the city. Through most of the first half of the century, Las Vegans accepted Red Rock Canyon as it was. Little thought was given to affirmative efforts to preserve or develop the recreational resource, largely because no need for that action was perceived.

After World War II, as the city began to grow, interest in preservation and development of the canyon picked up. With more people in the city, pressures on the resource increased. More people looked to the canyon for day-trip recreation. Vehicles often were used to get into and out of the area. Group camping picked up with its attendant problems of sanitation and litter. The canyon became a dumping ground for all sorts of urban refuse, from old car bodies to refrigerators, to the occasional human body.

In the early 1960's, local citizen groups and the Clark County Board of Commissioners petitioned the National Park Service to assume management responsibilities for Red Rock Canyon and develop its recreational potential. The Service then, as now, managed Lake Meade National Recreation Area. The Park Service declined the offer on the ground the area did not have national significance.

In June, 1964 a working committee of agency representatives and citizens was organized to begin planning for Red Rock Canyon. The League of Women Voters, Sierra Club, and other groups developed a public questionnaire to obtain the feelings of the general public about the future of the canyon. Some 3,5000 responses were tabulated. More than 30 concrete recommendations came out of the study. Overall, it was recommended that BLM manage the canyon for recreation; that a plan to that end be developed, and that other uses which conflicted with the recreation values be eliminated or curtailed. The BLM accepted all recommendations. Preparation of the plan began in August, 1967 with the formation of a team consisting of private citizens, Nevada State Parks personnel, and BLM recreation planners. A consulting board representing agencies, private citizens, and public interest groups was established to guide the work of the planning team.

Throughout the next 12 months a strong dialogue developed among the planners, and between them and the public. There was much discussion over the level of development appropriate for Red Rock Canyon. On the one hand were those who wished management in the canyon to be largely protective in nature, with minimal development of roads and facilities. The general objective was to make the recreation experience as close to pristine as possible. On the other side were those who argued that a recreation area as close to a major urban area as Red Rock was, ought to have facilities which could respond to the demands of that population; that the demands would not be for such a pristine recreational experience, but for a diversionary, interpretive, and picnicking type of outing.

While the planning and development dialogue was going on, BLM and Clark County, along with a number of civic groups, organized a major cleanup of the canyon in the fall of 1967. Debris, rusted hulks of old cars, discarded household items, and other trash, were hauled away in preparation for the dedication of Red Rock Canyon Recreation Lands in October. The ceremony was conducted at what is now called Red Rock Vista and attended by State and local dignitaries. Prior to the dedication, the canyon and much of the sandstone bluffs and the area west of them were classified for multiple use management and withdrawn from appropriation under the public land laws and the general mining laws.

In August, 1968 the planning team presented its master plan for Red Rock Canyon the public. Most felt that some development was needed, but only to the extent that the natural environment and esthetics were not damaged.

Implementation of the plan began shortly thereafter. In June 1969, a cooperative agreement between BLM and Nevada Division of State Parks (NDSP) was signed, providing for joint management of the recreation land. Camping and picnicking facilities were improved. Contracts were prepared and let for the construction of Segment "A" of the Scenic Loop Road. With the completion of Segment "A" in May, 1972, a public opinion dam burst. A June 1 letter from the Nevada Open Spaces Council, criticizing the way in which the road was built, precipitated a June 22 public meeting during which the whole concept of development as projected in the 1968 master plan was severely mauled. The upshot of the meeting was an agreement by BLM to write an Environmental Impact Statement (EIS) on the plan.

The year-long preparation period of the EIS revealed serious public discontent with the level of development proposed for the entire recreation land, including the upper sandstone bluffs, in the 1968 master plan. While there remained support for moderate development on the

canyon floor--mainly interpretive type facilities to accommodate expected crowds of Sunday drivers and tourists--sentiment was strong for preserving the natural qualities of the sandstone bluffs. Development in the canyons of the bluffs, on the top of the bluffs, and on the western slope of the bluffs was largely opposed. Development on the floor of the canyon was to be kept to a minimum and that should blend in well with the existing environment.
The result of the EIS was a new concept for management of the RRCRL which eliminated development in and above the bluffs, and which emphasized minimal and well-blended development in the canyon. Except for the interpretive aspects of the visitor center and the scenic drive, most recreation would be primitive, concentrating on non-mechanized use of the natural resources throughout the area. In support of this concept, a new master plan was developed under a contract let jointly by the BLM and the NDSP. The plan was completed and distributed to the public in mid-1977. Some continue to express concern over the leve of development stated in the new plan. When Segment "B" of the Scenic Loop Road was completed in 1978, there was negative comment from some quarters over early cuts and fills along the roadway which were considered excessive.

Under the current plan of development, there should not be an unusual amount of adverse comment about the bureau's activities in the Red Rock Canyon. That simply recognizes the inability to please everyone. It is significant, however, that the relatively moderate scars produced by Segment "A" in 1972 produced a strong negative public reaction. Proposals which do or could exceed that level of intrusion in the canyon would certainly generate a much higher leve of public criticism. It is likely, moreover, that the level of protest would progress geometrically in comparison to an arithmetical increase in the intrusions.
(Spring 1980) During the November, 1979 comment period, there were 2,519 public responses to the general issue of drilling or not drilling for oil in RRCRL. A few members of the public addressed the draft environmental assessment (DEA), but most simply responded to the basic question. A compilation of the responses is shown in Table 10-1.

Table 10-1

Compilation of Public Responses to the RRCRL O&G Lease Issue

Response Media	Number Pro-Leasing	Number Anti-Leasing
Letters	74	204
Telephone Calls	212	200
Petitions (Signatures)	11	1,818
Totals	297	2,222

The Las Vegas news media gave prominent coverage to the story. Lengthy news and feature stories were written throughout the month by all three daily newspapers in the city. Each of the three network-affiliated television stations in the city, along with the public broadcasting station, ran several items about the issue. KLAS-TV 8 developed an half hour-long public service documentary on the issue which was broadcast during prime-time on a weekend. Local radio stations also provided extensive coverage of the story. In all news coverage, the media gave even-handed treatment of the issue, discussing it with BLM officials as well as local proponents and opponents of RRCRL leasing. Two of the daily newspapers took editorial stances on the question, in both instances calling for the rejection of the leases in favor of the recreational use of the RRCRL.

The issue also received national coverage in the New York Times and several oil and gas magazines.

Interest in the issue was undoubtedly heightened by the invasion on Nov. 4, four days after the DEA was released to the public, of the American Embassy in Tehran by Iranian terrorists and the subsequent developments in the hostage situation. During November President Carter halted all oil impoprts from Iran, adding to the public's developing sense of an energy crisis.

It appeared to BLM staff members (those taking the phone calls in particular) that the energy crisis aspect of the issue was encouraging another public than the normal Red Rock or BLM constituancy to respond to the agency in this particular instance. This seemed to be a public not normally attuned to BLM activities, but which was very much concerned about the likely impacts of further deterioration of the energy situation on their social and economic lifestyles. This group argued, in general, that it was appropriate, at this time, to sacrifice recreational values in favor of meeting energy requirements.

On the other hand, there was a heavy outpouring of sentiment against oil and gas development of RRCRL. Many argued that the energy crisis was not now--and never would be--approaching the stage where the scenic and recreational values of RRCRL needed to be sacrificed. Others spoke of the outstanding recreational experience they and their families had had in RRCRL. All spoke of Red Rock Canyon as a particularly valuable recreational resource in Southern Nevada.

A small number of respondents to the issue during the comment period stated the DEA was weighted too heavily towards the recreation resource in RRCRL. This group stated that under BLM's multiple-use mandate, more attention ought to be given to the mineral resource (oil and gas) and a stronger investigation made into how, if at all, oil and gas exploration and development could proceed using appropriate mitigating measures to reduce or eliminate adverse impacts to the recreation resource.

On March 22 and 29 and April 12, a group of students and faculty members from the University of Nevada, Las Vegas, organized demonstrations along the Red Rock Scenic Drive to urge denial of the lease applications. During these events, signatures of some 1,500 passersby were gathered on petitions and subsequently delivered to BLM. (The later petitions have not been compared to the earlier ones and to the letters to determine the number of duplicate signatures, if any.)

All public comment--letters, petitions, and telephone logs--are on file at the district office and available for public review.

CHAPTER 11

SUMMARY—CONCLUSIONS

SUMMARY—CONCLUSIONS

The proposed action requires the Bureau of Land Management to resolve a classic conflict of resources uses by man. Ironically, the two uses in question--Mineral Recovery and Recreation--are intimately joined by the major topographic feature of the RRCRL, the Sandstone Bluffs. On the one hand, the escarpment is a premier, visible display of overthrusting and block faulting which are the roots of the geological theory that the Overthrust Belt has high potential for oil and gas discovery. On the other hand are the aesthetic elements of this same escarpment--the striking bands of color, the beautiful formations, the awesome majesty--which make it the major factor in the public's assignment of high recreational and scenic values to the RRCRL.

The values at risk from oil and gas operations in the RRCRL are ultimately recreational. The high quality of these values come from the unusual combination of resources present in the area: the exceptional scenic and sightseeing opportunites dominated by the sandstone bluffs; the unique vegetative communities found below the bluffs and in the canyons; the exceptional hiking, camping, climbing, and the wilderness experiences available on top of and to the west of the escarpment; the presence of wildlife such as bighorn sheep, mule deer, and smaller animals, particularly in connection with the unusually verdant vegetation found in some locations.

An important--perhaps paramount--consideration in this respect is that the high recreational values perceived in the RRCRL by Southern Nevadans since the turn of the century flow from the unique relationship of the different resources found there. Take away one element--say, the water that comes out of the narrow canyons of the escarpment--and the unique vegetation in the lower washes might disappear. Changes in the vegetative makeup of small areas will have impacts on the visual experience far out of proportion to the size of the disturbance.

For the majority of Southern Nevadans, "Red Rocks" is the escarpment and the valley it overlooks, from the Calico Hills south to the Old Nevada/Bonnie Spring Ranch complex. Analysis indicates that this is, in fact, the heaviest used portion of the RRCRL, the area with the highest scenic values, and the area with a low or moderate potential for rehabilitation of surface disturbances.

The southern and southeastern portions of the RRCRL, south of the Bonnie Spring Ranch and west of the town of Blue Diamond, are not shown by analysis to contain values--scenic, vegetative, archaeological, wildlife, etc--of the same character and magnitude as the immediate escarpment area.

On the western and northern slopes of the RRCRL-- the backcounty--the land is of a different character. The vegetation is lusher and surface rehabilitation potential is higher, both a result of the deeper soils and higher precipitation in those zones. Wildlife is more abundant. Here is found the crucial bighorn sheep yearlong habitat. Here also are found the two candidates for wilderness identified by the Las Vegas District.

Use in the back county is lighter. More emphasis is on strenuous forms of recreation such as hiking, camping, hunting, and so on, as opposed to the more casual, sightseeing and picnicking activities common below the escarpment.

Because of this human perception--and use--of the RRCRL as having exceptional recreational values, the management direction by BLM and the NDSP during the last decade has been to maintain and enhance recreation there. To this end $8 million in public funds have been spent or committed by the Federal government and the State of Nevada in developing recreation opportunities in Red Rocks. That management direction has enjoyed the overwhelming support of Southern Nevadans.

Oil and gas operations following from the proposed action of granting the leases could impact most strongly on the scenic values by altering the character of the landscape through topographic changes, soil disturbance, and vegetative destruction. This could indirectly affect the recreational experience. Direct effects on recreational opportunities could occur as a result of displacement of actual or proposed recreational facilties. Other indirect impacts on the recreational experience could flow from the sights, sounds, and smells of the oil and gas operations during the later stages of development and production. Wildlife could be adversely affected, primarily through the loss of important habitat. Unique vegetative communities, important to recreation, but also valuable in their own right, could sustain serious degradation. Left to themselves, oil and gas operations could impose major changes on the landscape and character of the RRCRL so as to permanently damage the long term productivity of the various elements making up the recreational lands, thus permanently damaging the long term recreational values there.

Analysis indicates, however, that many of the anticipated impacts to the individual resources in the RRCRL, and to the resource relationship that produces the high recreational values, can in fact be greatly reduced or eliminated. Available mitigating measures are many. They range from an absolute ban on surface occupancy in certain key areas, to restrictions on some types of oil and gas-related activities in other areas, to requirements to paint or otherwise camouflage above-ground structures. Thus, important wildlife habitat and unique vegetation types could be protected by surface occupancy prohibitions. A key measure to offset impacts on vegetation could be to require not only rehabilitation of such disturbances, but to have an approved plan of rehabilitation before the disturbance begins. Scenic values could be protected through no-surface-occupancy requirements along with camouflaging measures, well spacing requirements, etc. Other critical resources and human uses could be protected by application of one or more of the 24 mitigating measures which could be applied directly to the lease or by one or more of the 17 "operational measures" identified for use when specific oil and gas activities are proposed by an operator.

Although many of the adverse impacts of imposing an industrial element on a natural recreational area can be offset or eliminated, impacts nonetheless remain. They will affect the short term recreational uses of the RRCRL, but the degree of impact is a function both of the success of the operator in diminishing the visibility of his presence, and each visitor's perception of the appropriateness of that activity. It can't be quantified, but the degradation will be there.

For long term recreational use, there remains an element of risk. Rehabilitation plans of man approved by the district manager, may not be so successful under Mother Nature's sometimes harsh hand. Likewise, accidents happen, al biet their on shore probability is low. Fires, blowouts, oil spills--a variety of unintended actions--can cause serious, long-term damage to vegetation, wildlife, soils, and water. If the element affected is particularly sensitive, it may never recover.

On the other side of the ledger is the value of the oil and gas. The value right now, is speculative, as are all of Southern Nevada's oil andgas reserves. In particular, the statistical chances of finding an economic field of oil and gas in RRCRL are less than two out of one hundred.

Should an economic field be discovered, it could aid in freeing the United States from dependency on foreign energy sources. Whether the amount discovered would be significant in that regard, is speculative.

Granting the leases, in whole or part, could provide economic benefits to the four lease applicants. The amount is not clear. Denying all or part of the applications, or severely limiting the use of the leaseholds, could cause potential economic losses to the applicants.

Granting the leases would also generate funds for both the U.S. government and the State of Nevada. The amounts, however, are not significant in the budgets of the two governments. Discovery of a producing field would generate additional royality monies, but such a discovery has a low likelihood at present.

To conclude, many of the severe impacts to both the natural resources and human uses of the RRCRL can be offset or eliminated. There would still be some degradation of the recreational use during the short term of oil and gas operations. A risk persists in that a failure to successfully rehabilitate, or a major accident, could cause significant long-term damage to the resources and the unique relationships that make up "Red Rocks." Whether oil and gas reserves exist in economic quantities, if at all, is speculative at this time.

CHAPTER 12

PARTICIPATING STAFF AND MANAGEMENT APPROVALS

PARTICIPATING STAFF AND MANAGEMENT APPROVALS

Team Member	Responsibility	Date	Surname
Brent S. Bestram District Geologist	Geology	6/11/80	Brent S. Bestram
Claudia A. Carlton District Soil Scientist	Climate; Air Quality; Soils	6/11/80	Claudia A. Carlton
Edward T. Ciliberti District Public Affairs Officer	Intensity of Public Interest	6/10/80	Edward T. Ciliberti
William T. Combs District Wild Horse and Burro Specialist	Wild Horses and Burros	6/12/80	William T. Combs
Lois Kvool Clerk Typist	Typist	6/10/80	Lois Kvool
David E. Loomis District Economist	Socio-Economics	6/24/80	David E Loomis
Robert C. Nauert District Realty Specialist	Land Status/Use; Planning	6/10/80	Robert C Nauert
Roy D. Price Biologist	Wildlife	6/11/80	Roy Price
Stanton D. Rolf District Archaeologist	Cultural Resources	6/11/80	Stanton D. Rolf
John C. shive Chief, P&EC (Range Specialist)	Vegetation	6/10/80	John C. Shive
Robert K. Taylor District Landscape Architect	Topography: Visual Resources	[illegible]	Robert K Taylor
Gregory S. Thomsen Supervisory Area Outdoor Recreation Planner	Recreation	6/10/80	Gregory S. Thomsen
Mark E. Vander Puy District Hydrologist	Water Resources	6/11/80	Mark E. Vander Puy
Marta L. Witt District Wilderness Specialist	Wilderness	6/11/80	Marta L Witt
Susan Matthews Cartographic Tech. NV. State Office	Maps and Printing	7-4-80	Susan Matthews

Technical Coordinator:

6/12/80
Date

Peter G. D. Ertman
Stateline-Esmeralda Resource Area
Geologist

Recommended for Approval by:

6/13/80
Date

John C. Shive   Chief,
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Coordination

6-12-80
Date

Terry R. Driver
Chief, Division of Resource Management

6-13-80
Date

William T. Civish
Stateline-Esmeralda Resource Area
Manager

Approved by:

6/13/80
Date

Frank E. Bingham
District Manager

CHAPTER 13

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APPENDICES

APPENDIX A

STANDARD OPERATING PROCEDURES FOR USGS/BLM ADMINISTRATION OF OIL AND GAS EXPLORATION AND DEVELOPMENT

STANDARD OPERATING PROCEDURES FOR USGS/BLM ADMINISTRATION OF OIL AND GAS EXPLORATION AND DEVELOPMENT

This section describes the regulatory aspects oil and gas operations considered in this analysis. Figure 1-2 illustrates each phase of oil and gas development. Appendix B describes the physical aspects each phase.

<u>Preliminary Investigation</u>

Geophysical surveys can be conducted on all public lands open to oil and gas leasing. A lease is not required to conduct these operations. A further description of geophysical survey procedures is in Appendix B.

<u>Leasing</u>

Before an oil and gas lease is issued from the State Office, it is sent to the local BLM district office for review. The district office staff reviews the proposal and recommends special stipulations over and above those contained on the lease form and the Open End Stipulation (BLM Form 3109-5). Special stipulations are designed to accomodate site specific circumstances. The Conservation Division of the USGS must concur with all such stipulations included in an oil and gas lease.

<u>Lease Administration</u>

USGS's soil and gas operating regulations are contained in 30 CFR 221. These regulations allow USGS to issue detailed explanations to lessees and operators whenever a specific situation demands further clarification. The guidance is published as Notice to Lessees (NTL). Three of GS's NTLs are directly related to situations that affect surface management: NTL-2B, Disposal of Produced Water; NTL-3A Undersirable Events; and NTL-6, Approval of Operations.

NTL-2B provides guidance for surface and subsurface discharge of produced water. NTL-3A provides guidance for notifying appropriate offices and reporting spills of hazardous substances. NTL-6 provides guidance for operators filing Applications for Permit to Drill and applications for subsequent development on the lease at a producing or support facility or in a developed field.

The NTL-6 is a milestone in the environmental assessment "tiering" effect built into the oil and gas leasing process. USGS preparès an EA on the drilling operations plan which offere an opportunity subsequent to the leasing EA, to provide site-specific protection to other resources.

After a lease is issued, the lessee or the designated operator notifies USGS and BLM of the intention to drill a well by submitting a Preliminary Environmental Review (PER). When finalizing plans to drill, and prior to actual surveying, a map must be filed with USGS and BLM. The map shows the preferred location and general topographic features of the area around the proposed well site. BLM reviews the current data base and notifies the operator within 15 days if there is any further information that may be helpful to him in the development of his Multi-point Surface Use and Operations Plan.

The lessee then notifies the USGS of his intentions to drill a well by submitting an Application for Permit to Drill (APD) and Multi-point Surface Use and Operations Plan. A multi-point plan is a statement of actions to be taken by an operator, including a description and map of the proposed area of disturbance, the size and type of equipment to be used, and environmental protection measures to be taken during operations. The plan must meet all the requirements of USGS's Notice to Lessees and Operators Number 6 (NTL-6).

USGS sends the acceptable APD to the BLM district manager. GS and BLM conduct an onsite examination with the operator and his contractors. The environmental impacts of the proposed action are analyzed. The field examination usually leads to the formulation of the stipulations to be included in the APD that protect specific resources. If BLM concurs with the proposed operation, and the GS finds the proposal acceptable, USGS approves the APD.

After an APD is approved, USGS and BLM make periodic checks to insure that the operator is in compliance with the terms and conditions of the lease and approved plan of operation.

Approval of Subsequent Operations

Before repairing, deepening, or reconditioning an existing well a detailed written work plan must be submitted to USGS. The same procedure is followed for plans that involve new construction, reconstruction, or alteration of existing facilities. When additional surface disturbance would result, USGS and BLM must concur before any approvals are given.

Abandonment

Well abandonment requires approval by USGS and BLM. BLM may require additional surface rehabilitation before abandonment. Abandonment will not be approved until surface rehabilitation work required by the APD or abandonment notice is complete and required revegetation is established to the satisfaction of the BLM district manager.

Water Well Conversion

If the BLM decides to acquire the well as a water well, it must decide to assume responsibility at the time of the APD is filed. The operator will plug the well at the bottom of the desired freshwater zone during abandonment and leave the casing in place. The operator will then begin surface cleanup as required.

Other Requirements

The Environmental Protection Agency (EPA) has issued regulations affecting all oil and gas lessees and operators (40 CFR 112). These regulations require owners, operators and drillers to prepare Spill Prevention Control and Counter-measure Plans (SPCC Plans). The EPA does not make special inspections to see that operators have SPCC Plans. The agency can ask for one at any time. If an operator then does not provide it he is subject to a fine. After a hazardous material spill, the EPA usually calls for the operator's SPCC Plan.

Oil and gas operators must also meet several requirements of the Department of Transportation and the Interstate Commerce Commission (49 CFR 191-192) for the transportation of their products by pipeline.

Operation Procedures

Operations on a Federal lease are administered by the Conservation Division of the USGS. The division of responsibilities for leasing and operations on a lease between BLM and GS caused the Secretary of the Interior to issue Secretarial Order (SO) 2948. That set forth the administrative and managerial procedures for Departmental onshore mineral leasing and operating activities. Implementation of SO 2948 has been elaborated in a Cooperative Procedure Agreement between BLM and USGS.

The Cooperative Procedure Agreement established USGS as the point of contact for oil and gas operations on a producing lease. USGS provides the Secretary with expertise for conservation of the mineral resource, production, rentals, and royalties on leases. BLM provides the Secretary with expertise for surface reclamation of the lease and protection of other environmental elements.

APPENDIX B

DESCRIPTION OF OIL AND GAS OPERATIONS CONSIDERED IN THE RRCRL ANALYSIS

DESCRIPTION OF OIL AND GAS OPERATIONS CONSIDERED IN THE RRCRL ANALYSIS

Preliminary Investigation

An area of interest is studied by 1) review of the geologic literature, 2) detailed examination of aerial photographs and geologic maps and 3) full sampling of outcrops. Following this, a geophysical exploration program is undertaken. Geophysical exploration can be conducted on leased and unleased lands. This work is sub-contracted by oil companies or done by consulting geologists who may then sell their information to oil companies. With the information obtained, oil companies, or others, may request that lands be offered for lease, or they may proceed with exploratory drilling on existing leases.

The Federal Regulations (43 CFR 3045) for oil and gas exploration operations require cooperation between the BLM District Manager, his staff, and geophysical operators. BLM does not require a permit for geophysical operations, but it does require a permit before earthmoving equipment can be used on public lands.

The geophysical industry and BLM mutually developed standards that operators will follow when conducting geophysical operations on public lands. 1) The geophysical operator has a responsibility to cooperate and coordinate his operations with the BLM District Manager.
The geophysical operators requirements are:

- to file, in person or by mail, a "Notice of Intent to Conduct Oil and Gas Operations" (Form 3040-1) for all operations on public lands. The notice includes maps showing the location of the line and all access routes. It must be filed in the BLM District Office before operations begin. The maps should be a minimum scale of one half inch to one mile. Where available, USGS 7.5 minute quadrangle maps should be used.

- to be bonded.

- to notify the District Manager before entering onto public lands.

- to obtain the District Manager's prior written approval before commencing any surface disturbing activities such as with bulldozers.

- to notify the District Manager in writing of any changes in the original notice and secure written approval for proposed changes before proceeding.

- to comply with written instructions and orders given by the District Manager at the prework conference or field inspection before actual work begins and during field investigations.

- to notify the District Manager that his operations are completed and that he is leaving the land listed on the notice.

- to file a "Notice of Completion of Geophysical Exploration" (form 3045-2) in person or by mail after rehabilitation work is completed.

- to submit an acceptable archeological survey (if required) if dirt work is appproved.
- to comply with all applicable Federal, State and local laws such as the Federal Land Policy and Management Act of 1976, Threatened and Endangered Species Act, Historic Preservation Act of 1966, and others.

The four most common methods of geophysical exploration are drilling shot holes 50 to 200 feet deep; vibroseis or thumper; 5 to 15 lb surface charges; and primer-cord or ditch-witch. Drilling shot holes, vibroseis, and primer-cord involve the use of heavy truck-mounted equipment.

Shot hole drilling involves four to twelve holes drilled per mile of line. However, the number will vary according to terrain and the size of charge. The holes are normally eight inches in diameter, and are loaded with 5 to 10 pound charges.

Operators sometimes encounter water in drilled shot holes. The water may flow at the surface or it may rise a certain distance in the drill hole. Whenever water is encountered in a drill hole, the hole must be sealed sufficiently to stop the flow of water from the aquifer from which it originates. This can be done by cementing to a depth of 20 feet below the aquifer, through the aquifer, and 20 feet above the aquifer. A five-foot cement plug must be placed in the drill hole two feet below the surface. Another acceptable method is filling the drill hole under pressure with heavy bentonitic mud from botton to top. If no water is encountered in a drill hole, a short plug placed seven feet below the surface is acceptable. The hole is then backfilled with cuttings.

Drilling of shot holes requires some water. Three to four hundred gallons per day is used by a typical operation.

The most common evidence that a seismic drilling program has been conducted in an area is the presence on the surface of cuttings and mud from the drill hole, and vehicle tracks in the surface soil and across vegetation. The mud and cuttings that are not placed back into the hole are scattered around the drill hole so that a thin layer of mud and cuttings remains. Enough scattering of the mud and cuttings should occur so that low growing vegetation is not covered. The evidence usually disappears within a year.

The thumper or vibroseis methods use truck-mounted equipment to pound or vibrate the earth. Less than 50 square feet of surface area per truck is required to operate the equipment at each test site. If a vibroseis crew does not depart from existing roads and trails, no evidence of their presence can normally be found. If they travel cross country in low growing vegetation, vehicle tracks on the surface and across vegetation can be found. They usually disappear within 3 to 4 years.

The primer-cord method involves the use of 200-grain explosive cord buried 18 to 36 inches below ground level. This is buried in a slot created by a 4-wheel drive tractor ("plow") pulling a 1 1/4 inch wide knife-blade on a vibrating platform. This resembles a saber-saw effect. The cord is laid simultaneously with slot formation. Blowouts occur approximately 60% of the time in Southern Nevada. Rehabilitation is accomplished by refilling the blown-out area with the material blown out.

The methods discussed above use truck-mounted recording equipment and small detectors (geophones), placed in contact with the ground at spaced intervals. The geophones record the time it takes the shock wave to return from the subsurface. The seismic equipment is mobile and, with the exception of small one-half to five-pound geophones, all the equipment is truck-mounted. The geophones are located along straight lines laid out by surveyors on a one to two mile grid. Existing roads are used where available. Trails may be cleared of vegetation and loose rock to improve access for the trucks. This, as stated previously, requires a permit. Dropping the dozer blade to clear brush and establish roads is not generally permitted.

In areas of rugged terrain, no access, and in wet seasons of the year, seismic work is sometimes done using a portable method. Men and equipment are flown into an area by helicopter from a staging area, or they may choose to gain access into an area by horseback. The geophones are placed on the ground in the same type of grid pattern mentioned earlier, but all the smaller equipment is now backpacked by the crew. Explosives are placed on stakes 3 to 4 feet off the ground, placed directly on the ground, or in shallow, hand-dug holes. The recording equipment is almost always helicoptered into the area and transported from one place to another by the same method.

When the charges are detonated on stakes they do not blow holes in the ground. Grass, forbs, and shrubs with twigs smaller in diameter than a human finger are usually blown away, but the roots are not damaged. Larger woody plant stems are not normally affected. Most vegetation begins recovery immediately since their roots have not been destroyed. Within a year no evidence of the activity can be readily found.

A typical seismic operation may utilize 10 to 15 men operating five to seven trucks. If they are backpacking equipment the same number is usually required. Under normal conditions, three to five miles of line can be surveyed and shot each day in vehicle situation. When backpacking two to three miles per day is a normal average.

Exploration

Drilling Operations: Drilling commences by setting conductor pipe to a depth of 15 to 20 feet to keep surface sand and dirt from sloughing down the well. Then the rotary drill bit and drill string are rotated and gradually lowered into the conductor pipe as the bit bores into the earth. Another string of pipe called surface casing is set inside the conductor pipe when the hole reaches a depth of several hundred feet. Surface casing is a safety string to protect fresh water and sands, and to prevent the well from "blowing out" if a high pressure zone is encountered. Cement is used to fill the space between the side of the hole and the surface casing to prevent fluids from leaking and to anchor the casing. " Mud" (a mixture of water, clay, and chemical additives) is forced under pressure down the drill pipe to cool and clean the drill bit and to carry cuttings to the surface. If no oil and gas is encountered, the well is plugged with cement and abandoned. If the well is a producer, casing is run to the bottom of the hole and cemented in place.

Construction Procedures - General: Surface disturbance during construction of the access road and well site can be significant. The degree of surface disturbance necessary depends on terrain and depth of the drill test. Drill rig size and the rig's mud system efficiency are also factors: i.e., a 20,000-foot capability rig could be used on a 14,000-foot hole. Reserve pit size may vary up to two times for rigs of the same size because of different mud system efficiencies. The depth of the drill test determines the size of the work area necessary, the need for all weather roads, water requirements, etc. Terrain influences the construction problem and the amount of surface disturbance. It causes less disturbance to build in the flats than in the mountains.

Access Roads: In general, access roads to well sites are 16 to 18 feet-wide running surfaces that are ditched on one or both sides. The area along the route is first cleared (approximately four to ten acres per mile) of vegetation and rocky debris by blading with a motor patrol. The borrow ditches are cut, and the material used to crown the running surface. A layer of rocks or gravel is often placed on the road to facilitate use during wet periods. Many of the roads constructed would follow existing roads or trails: however, new roads may be necessary, because existing roads are not at an established standard (e.g. too steep) making it necessary to realign the road. New road construction usually requires additional equipment such as bulldozers and motor scrapers to move larger volumes of material. Normally, additional culverts are necessary which requires backhoes and/or draglines to clear channels, etc. The vegetation is usually disposed of by burning, burying, or spreading. The method used depends on vegetation type and volume. Roads may be permanent or temporary depending on the success of the well. The initial construction may be for a temporary road; however, it is usually designed so that it can become permanent if the well produces. Not all temporary roads constructed are rehabilitated when the drilling stops. A temporary road is often used as access to other drill sites or for further development. The main roads, and often temporary roads, require graveling to maintain them as all weather roads, an especially important consideration during wet Spring months.

Well Site: The well sites are usually two to six acres in size and cleared of all vegetation. The combination of rough terrain and deep wells makes the larger disturbed areas the norm. Construction begins by stripping away all available topsoil. A location with eight inches of available topsoil can easily yield 5,000 cubic yards of material which must be stockpiled near the site for later use in reclaiming the area. Small shrubs, grasses and forbs may be mixed with the topsoil or disposed of by burning or burying, depending on the volume and type.

The dimensions of a pad for drilling to depths of 17,000 to 20,000 feet are about 400'x475'. The dimensions of the mud pit are about 225'x175' by 10' to 14' deep. The mud pits may or may not be located on the pad. For a local example, the Mobil Oil Company's Virgin River No. 1-A USA well has the following dimensions: well pad size-236' x 425'(not including mud pit); mud pit size: 200' x 100' x 15' 2.76 acres. The mud pit is adjacent to the pad.

A list of items usually found on a location during drilling include:

- Drill Rig
- Diesel engines
- Fuel storage tanks
- Water storage tanks
- Drilling mud storage
- Trailers for geology lab or mud laboratory
- Vehicle parking
- Pipe and piperacks
- Trash pit

Next, the platform is constructed using bulldozers and/or motor scrapers. The platform is usually flat, to accommodate the drill rig and its support equipment, and large enough to store all the equipment and supplies without restricting safe work area. The drill rig itself must be set up on cut, not fill. Use of fill presents the danger of the rig falling over because of unstable ground. The degree of cutting and filling necessary depends on terrain, i.e., the flatter the site, the less the work. Hill side locations are common, and the degree of dirt work varies with the steepness of the hill. It is normal to have more cut than fill. In this situation the excess material is stockpiled on the location. Eventually all fill material should be put back into the original cut area.

The reserve pits are constructed adjacent to or on the well pad. In steep country it is now common practice to place the pits adjacent to the highwall. In other areas it is common to place the pits at one downslope end of the pad. Pit construction involves excavation and embankment construction to form a pond to hold drilling cutting and fluids. The size and the number of pits is dependent of the depth of the well and anticipated down hole problems, i.e. excess water flows.

Water Supply: An adequate supply of water is required for drilling operations and other uses. The sources of water can be a water well at the drill site or remote sources such as streams, ponds, or wells. The water is transported to the rig by truck or pipeline. Pipelines are normally small diameter surface lines. The operator must file for and obtain all necessary permits from the State Engineer. On public lands an operator must also have BLM's permission before surface water can be used. Most rigs require two barrels (84 gallons) of water for every foot drilled.

WELL SITE ABANDONMENT AND REHABILITATION

When a well is unsuccessful, the drilling rig and all support equipment are removed from the location.

In practice, abandonment of the drilling operation is routine, but surface rehabilitation can be very difficult. The degree of difficulty and expense to rehabilitate a site is dependent on topography, e.g. sites and roads on hillsides are harder to rehabilitate than those in the flats. Normally rehabilitation does not begin until the fluids in the reserve pit have been removed or evaporated. These fluids can be toxic to plant and animal growth, and special care in handling the fluids is necessary. It often requires six to nine months for a reserve pit to dry, even longer at high elevations.

When rehabilitation does begin, bulldozers, motor scrapers, motor partols, and backhoes or draglines can be used to move the dirt back near its original place. The site is contoured to blend into the adjacent topography. Then topsoil is placed, and the area is seeded.

DEVELOPMENT AND PRODUCTION

Spacing Requirements: In the event of successful exploration, well spacing pattern must be established before development drilling begins. Information considered in establishment of a spacing pattern includes data from the discovery well on porosity, permeability, pressure, composition, and depth of formations in the reservoir; well production rates and type (predominantly oil or gas), and the economic effect of the proposed spacing on recovery.

Most spacing for production from Federal leases for oil is 40 acres per well. The normal spacing for gas production is 640 acres per well. When larger spacing units are established, they are usually in multiples of 40 acres.

USGS controls spacing for oil and gas on a Federal lease. All wells must be in the center of a 40-acre legal subdivision with a possible variance of 200 feet in a north-south and east-west direction. Spacing for efficent production from a geological formation depends on such factors as reservoir characteristics and drive mechanisms. If an operator can show that different spacing is needed for maximum recovery, USGS can make exceptions to the rule. Exceptions may be granted provided there are no geologic or legal problems.

Production: Production in an oil field is often concurrent with development operations. The oil may be hauled away by truck at first, but as development proceeds and reservoir limits are learned, feederlines and pipelines are installed. The extent of such facilities is dictated by the number of producing wells, expected production, volume of gas and water produced with the oil, the number of leases, and whether the field is to be developed on a unitized basis.

Production in a gas field does not begin until the pipeline to a market has been constructed or tied into. Pipelines are not justified until sufficient gas reserves are proved by drilling operations. Gas wells are often shut-in after completion, for periods ranging from months to years, until pipeline connections are available.

Support Facilities: Once a field is in a development and production situation, the need for support facilities greatly increases. Some of these needs are primarily for production and some are safety.

Pipelines for transportation of the product will be needed. Some pipelines will contain gas and some will contain oil. Some of the gas will be going to market and some of the gas will be used in the field for production.

There usually is an increase in the number and width of roads. They will be used for access to the field, maintenance, access to the wells, and access for tank trucks that may be hauling the products to market. Tank batteries may be placed in some areas. They will be used as a collection point for the product as well as a shipping point for products going to market.

Communication needs will increase. Underground telephone lines are the most common today, and will require rights-of-way. Repeater sites may also be needed for telephone and two-way radio.

Power needs will increase. This will require rights of way for main lines and rights-of way to each well site, tank battery, and production office facility.

Surface Uses

Surface uses required for development may include well pads, access roads, flowlines, transportation pipelines, tank batteries, facilities to separate oil, gas, and water, and communication sites.

When construction begins on a well site, access road, pipeline, tank battery, etc., vegetation less than three feet high is bladed or a brush beater is used to knock vegetation down. Larger woody species are sawed up and the stumps and bases are grubbed out and removed from the area. Soil material (if available) is removed and stockpiled for redistribution after construction is completed. The dirt work is then done depending on whether a pad, pit, pipeline, battery site, access road or communication site is being constructed. Large equipment such as bulldozers, scrapers, backhoes, flat bed trucks carrying pipe, derrick, engines, trailers etc, pipelayers, welders, motor patrols, etc., may be present on the lands. They occur during construction, removal operations, and rehabilitation. Their presence at a site is short term.

If the well becomes a producer, the area no longer needed for production is rehabilitated. This is usually the area outside the permanent anchors installed to tie-down workover rigs. The sides of the location are reduced, recontoured, soil material is replaced, and reseeding and/or planting is accomplished. The remaining area of bare ground is approximately one acre. All that will remain on the well site is a concrete pad, pumpjack and engine, or a christmas tree if the well is free flowing. One single lane access road 12 to 16 feet wide is necessary for access. The engines operating the pumpjack are either electric or internal combustion powered by diesel, propane or natural gas from the well.

Tank Battery

If a tank battery of one to two tanks is constructed on the location, another acre of surface area will be occupied. Other improvements at the battery can include fences, load out facitlities, and spill prevention dikes. The bare ground at the well site would now total about two acres.

Tank batteries are common on every well site during initial development of a field, but after the field limits have been defined they can be replaced by pipelines. Batteries can then be centrally located, located next to access roads, hidden behind vegetation or hidden by topographic features (an actual camoflauge). If a battery is constructed seperately from a well site, an acre of surface is usually needed for every three average-size tanks. Safety requirements come first in this situation; therefore, an operator is given whatever area is absolutely necessary. Batteries can be painted to blend in with the natural setting. Earth tones of tan, red, brown are common in scenic areas. Vegetation greens are also very acceptable colors from a safety and aesthetic viewpoint.

If water is produced with the oil and gas a pit is needed adjacent to the tank battery. USGS's NTL-2B requirements have to be met in order for such a pit to be approved. If oil and grease is anticipated on the water in the pit, protective covering or flagging is required to prevent water fowl from landing in the pit. Produced water is disposed of by an EPA approved discharge permit, reinjection into the formation from which it was produced, or evaporation from the pit. Pits can range in size from 50' x 50' to 400' x 400'. Size is dependent upon the amount of water encountered during production.

Pipelines

Pipeline rights-of-way, from the well site to tank batteries or to main transportation lines are normally 50 feet wide. The actual amount of surface disturbance during construction of smaller gathering lines (four to eight inches in diameter) lines is about 35 feet. A major transportation line of 24-36 inches in diameter usually has the full 50 feet disturbed, and in some cases additional widths are disturbed. Pipelines can be surveyed so that they do not always run in straight lines. They can be routed around hillsides and vegetation such as trees to provide a camouflage. If pumping stations are necessary the above ground structures can be painted or camouflaged to blend into the natural setting.

Upon abandonment pipelines are usually left in place to avoid disturbing the surface once again. Surface support structures such as seperators, pumping stations, meters, etc. are removed.

Roads

One road to each well pad, pumping station, and tank battery is required. The following table is a generalization of the minimum design standards for common roads:

TABLE 1

	Single Lane	Double Lane
Width	16 foot	25 foot
Average Design Speed	15-25 M.P.H.	25-35 M.P.H.
Maximum Grade	10%	10%
Minimum Radius (feet)	65	100
Normal cut slope (back slopes)	2:1	2:1
Normal pitch	4:1	4:1

Upon abandonment well sites and access roads are obliterated whenever possible. Culverts and other surface improvements are also removed. Revegetation by seeding and/or planting begins.

APPENDIX C

SOIL ASSOCIATIONS LOCATED IN THE RRCRL

SOIL ASSOCIATIONS LOCATED IN THE RRCRL

Association 3015 occurs on a very small portion (5%) of the study area in the extreme northwest at elevations between 5,000 and 7,000 feet. Average annual precipitation is between 12 and 17 inches. Average annual air temperature is between 49° and 58° F.

3015 Bonanza-Penasco-Stormitt Families Association--Bonanza; loamy-skeletal, carbonatic, mesic Torriorthentic Haplustols--40% of map unit, gravelly loam surface, 15-30% slopes

Range site: pinyon-juniper(black brush)

Penasco; loamy-skeletal, carbonatic, mesic shallow Petrocalcic Calciustolls--30% of map unit, very gravelly very fine sandy loam surface, 4-15% slopes

Range site: pinyon-juniper(black brush)

Stormitt; loamy-skeletal, carbonatic, mesic Ustollic Calciorthids--20% of map unit, very gravelly loam surface, 4-15% slopes

Range site: Pinyon/Juniper(big sagebrush)

* * * * *

Association 3025 occurs in one unit on the alluvial terrace directly to the east of the escarpment. It makes up about 15% of the study area. Elevations are between 3,000 and 5,000 feet. Average annual precipitation is between eight and 13 inches. Average annual temperature is between 55°and 65° F.

3025-Canutio-Mohave Families Association--Canutio; loamy-skeletal, mixed (calcareous), thermic Typic Torriorthents--65% of map unit, gravelly loam surface, 4-8% slopes

Range site: semiarid limy slope

Mohave; fine-loamy, mixed, thermic, Typic Haplargids--15% of map unit, fine sandy loam surface, 2-8% slopes

Range site: semiarid limy plain

Included soils: shallow soils and lithic soils, 20% of map unit.

* * * * *

Association 3036 occurs in two units to the west and north of the study area. They occur on rolling to very steep mountains at elevations between 5,000 to 8,500 feet average annual precipitation is between 10 and 20 inches. Average annual air temperature is about 53° F.

3036 Deama Stormitt Families-Rock Outcrop Association--Deama; loamy-skeletal, carbonatic, mesic Lithic Calciustolls--40% of map unit, extremely stoney very fine sandy loam surface, 15-50% slopes.

Range site: pinyon/juniper (big sagebrush)

Stormitt; loamy-skeletal, carvonatic, mesic Ustollic Calciorthids--30% of map unit, very gravelly loam surface, 15-30% slopes.

Range site: pinyon-juniper(big sagebrush)

Rock out crop; mostly limestone, 20% of map unit--included soils: nihill family.

* * * * *

Association 3047 occurs in seven locations throughout the study area comprising about 20% of the study area. This association occurs on hills at elevations between 3,000 and 5,500 feet. Average annual precipitation is between 5 and 10 inches. Average annual air temperature is about 66°F.

3047 Isom-Mormon Mesa-St. Thomas Families Association--Isom; loamy-skeletal, carbonatic, thermic Typic Torriorthents--30% of map unit, extremely stoney fine sandy loam surface, 15-50% slopes

Range site: semiarid limy slope

Mormon Mesa; loamy, carbonatic, thermic, shallow Typic Paleorthids--25% of map unit, sandy loam surface, 15-50% slopes

Range site: semiarid limy slope

St. Thomas; loamy-skeletal, carbonatic, thermic Lithic

Torriorthents--25% of map unit, cobbly loam surface, 15-50% slopes

Range site: arid limy hill

Included soils: rock outcrop, mostly limestone, 20% of map unit

* * * *

Association 3049 occurs in six locations throughout ,the study area comprising about 15% of the study area. This association occurs on hill and mountain slopes and alluvial fans at elevations between 2,500 and 5,000 feet. Average annual precipitation is between five and 10 inches. Average annual air temperature is about 66° F.

3049 Isom-Weiser-St. Thomas Families Association--Isom; loamy-skeletal, carbonatic, thermic Typic Calciorthids--25% of map unit, cobbly loam surface, 15-50% slopes

Range site: arid limy hill

Weiser; loamy-skeletal, carbonatic, Thermic Typic Calciorthids--25% of map unit, very gravelly sandy loam surface, 15-30% slopes

Range site: arid limy scope

St. Thomas; loamy-skeletal, carbonatic, thermic Lithic Torriorthents 25% of map unit, cobbly loam surface, 15-50% slopes

Range site: arid limy hill

Included soils: rock outcrop, mostly limestone, 15% of map unit.

* * * *

Association 3053 occurs in three locations to the east and south of the escarpment comprising 15% of the study area. This association occurs on moderately dissected alluvial fans at elevations between 2,000 and 5,000 feet. Average annual precipitation is between five and 10 inches. Average annual air temperature is about 67° F.

3053 Mormon Mesa--Weiser Families Association--Mormon Mesa; loamy, carbonatic, thermic, shallow Typic Paleorthids--40% of map unit, sandy loam surface, 4-15% slopes strongly dissected.
Range site: arid limy upland
Isom; loamy-skeletal,carbonatic, thermic, typic calciorthids --30% of map unit, extremely stoney fine sandy loam surface, 8-15% slopes.
Range site: arid limy upland
Weiser; loamy-skeletal, carbonatic, thermic typic calciorthids--25% of map unit, very gravelly sandy loam surface, 4-15% slopes
Range site: arid limy upland
Included soils: rock outcrop, mostly limestone, 5% of map unit.

* * * *

Association 3074 occurs on the escarpment and Calico Hills. It comprises about 15% of the study area.
3074 Rock Outcrop
sandstone rock outcrop, 90% of map unit--included soils: Cajon Family and Lithic Torripsamments, 10% of map unit

feet. Average annual precipitation is between 9 and 10 inches. Average annual air temperature is about 47° F.

Jolly [illegible]--Loamy-skeletal, carbonatic, frigid, shallow Typic Calciorthids--40% of map unit, rocky loam surface, 4-15% slopes strongly dissected.
Range site: Arid limy upland

Ignal [illegible]--Loamy-skeletal, carbonatic, [illegible] Typic Calciorthids--15% of map unit, extremely stony fine sandy loam surface, 2-15% slopes.
Range site: Arid limy upland

[illegible]--Loamy-skeletal, carbonatic, [illegible] Calciorthids--[illegible] of map unit, very gravelly sandy loam surface, 4-15% slopes.
Range site: Arid limy upland

Included soils: rock outcrop, mostly limestone, 5% of map units.

* * *

[illegible] Unit occurs on [illegible] and [illegible] It occupies about 15% of the study area.
[illegible] Rock Outcrop--
sandstone rock outcrop, 70% of map unit--[illegible] ... [illegible] and [illegible], 10% of map units.

APPENDIX D

U.S. FISH AND WILDLIFE SERVICE INFORMAL CONSULTATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE

AREA OFFICE
2800 Cottage Way, Room E-2740
Sacramento, California 95825

FEB 14 1980

MEMORANDUM

To: District Manager, Bureau of Land Management, P.O. Box 5400, 4765 Vegas Drive, Las Vegas, Nevada 89102

From: ACTING Area Manager, Fish and Wildlife Service, 2800 Cottage Way, Room E-2740, Sacramento, California 95825 (SESO)

Subject: Status of Candidate Threatened or Endangered Flora in Red Rock Oil and Gas Proposed Leasing Area

This is in response to your letter of January 15, 1980, requesting information on the present and future status of formerly proposed endangered or threatened species. As mandated by the 1978 Amendments to the Endangered Species Act, the proposal to list 1,726 native plants (41 FR 24523-24572) was withdrawn on November 10, 1979, (44 FR 70796-70797). Still in effect, however, is the 1975 Notice of Review (40 FR 27823-27924) for the approximately 3,131 plant taxa which have not been the subjects of final rules and of which the Fish and Wildlife Service (FWS) has recommended be considered in environmental planning.

A new nationwide plant Notice is currently being developed at the field offices of the FWS and readied for publication in the Federal Register this spring. The list of plants which you submitted has been annotated by us (Attachment 1) to indicate what their tentative candidate status will be in the revised Notice of Review. Two of the ten species will not be included in this Notice. No plant taxa are currently proposed for listing in Nevada or, for that matter, in the United States.

The present status of the desert tortoise (Gopherus agassizi) is a candidate species. Aside from the Beaver Dam Slope population in Utah, the desert tortoise has never been formally proposed for endangered or threatened species status.

If you should require any additional information, please contact Joseph Dowhan or Jim Bartel of our Sacramento Endangered Species Office at FTS 468-4106 or (916) 484-4106. Thank you for your continued interest and cooperation in endangered species.

Attachment

cc: Regional Director, Portland, OR (AFA-SE)

JABartel:JJDowhan:la

2/19

2/20/80

Attachment 1

Angelica scabrida (T)

Arctomecon merriamii (SC)

Astragalus remotus - not being considered at this time

Coryphantha vivipara var. rosea (T)

Cryptantha insolita (E)

Cryptantha tumulosa (T)

Opuntia whipplei var. multigeniculata (T)

Penstemon bicolor bicolor (T)

Penstemon bicolor roseus (T)

Penstemon thompsoniae jaegeri (T)

(E) - candidate endangered

(T) - candidate threatened

(SC) - "species of concern" (to be maintained only in our files)

APPENDIX E

REPRESENTATIVE VEGETATIVE REHABILITATION TECHNIQUES

REPRESENTATIVE VEGETATIVE REHABILITATION TECHNIQUES

There are many different techniques and treatments which could be used to rehabilitate disturbed sites in the RRCRL. The following is a selection of the possible techniques that could be used:

1. Rip and harrow the drill pad to provide a seed bed.

2. Spread and dry drilling mud or bury with stockpiled top soil.

3. Seeding by rangeland drill on prepared seed beds; broadcast seeding on disturbed sites; planting nursery stock of native vegatation.

4. Haul in top soil, water the site to establish vegetation, fertilize the site to increase productivity.

5. Use bio-degradeable mulches held in place by burlap mesh to facilitate soil stabilization and plant growth on cutbank and fill slopes.

APPENDIX F

SCENIC QUALITY RATING CRITERIA AND RRCRL FIELD INVENTORY SHEETS

SCENIC QUALITY RATING CRITERIA AND RRCRL FIELD INVENTORY SHEETS

This Appendix describes BLM's VRM methodology, scenic quality rating criteria, and inventory and evaluation chart, and the field inventory sheets for the five scenic quality rating units within RRCRL.

* * * * *

Preservation and protection of the visual resources of the RRCRL, and all lands under the BLM's jurisdiction, was mandated by the Federal Land Policy and Management Act of 1976.

Within a physiographic province, areas with similar physiographic features are identified as scenic quality rating units (SQRUs). Seven key factors are rated and a score determined indicating the scenic quality class (Illustration 5).

The landscape within the lease study area was divided into four SQRUs. One additional SQRU, Pine Creek Canyon, was delineated due to the unique character of that particular area.

The rating units were field inventoried and rated and scenic quality classes determined.

An interdisciplinary team, consisting of William Civish, Stateline-Esmeralda Resource Area (SERA) Manager; Peter Ertman, SERA Geologist, and Robert Taylor, District Landscape Architect, rated each of the SQRUs and determined the scenic quality classes, "A" scenic quality being the most scenic and "C" the least.

Visual resource management classes were determined using the matrix in Illustration 4. Sensitivity levels were derived from recreation use volume and highway traffic counts. The scenic quality classes previously described were used, and distance zones determined, using the U. S. Forest Service's VIEWIT computer (See Appendix J).

* * * *

The illustrations and field inventory sheets follow.

Scenic Quality - Explanation of Rating Criteria

landform

Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangell Mountain Range in Alaska, or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches and other extraordinary formations.

vegetation

Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features which add striking and intriguing detail elements to the landscape; e.g., gnarled or windbeaten trees, joshua trees, etc.

water

That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

color

Consider the overall color(s) of the basic components of the landscape (i.e., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when in rating "color" are variety, contrast and harmony.

adjacent scenery

Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon verticality of topography, vegetative cover and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

scarcity

This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

cultural modifications

Consider the impact of change on the visual quality of the characteristic landscape. Cultural modifications in the landform/water, vegetation and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or actually complement or improve the scenery quality of a unit. Be careful not to confuse interest with scenery quality. Rate accordingly.

Scenic Quality - Inventory and Evaluation Chart

SCENIC QUALITY
INVENTORY AND EVALUATION CHART

key factors	rating criteria and score		
landform	High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features present and interesting though not dominant or exceptional. 3	Low, rolling hills, foothills or flat valley bottoms. Interesting detail landscape features few or lacking. 1
vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
water	Clear and clean appearing, still, cascading white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast or interest; generally mute tones. 1
influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. 6	Distinctive, though somewhat similar to others within the region. 2	Interesting within its setting, but fairly common within the region. 1
cultural modifications	Free from aesthetically undesirable or discordant sights and influences; or modifications add favorably to visual variety. 2	Scenic quality is somewhat depreciated by inharmonious intrusions, but not so extensive that the scenic qualities are entirely negated or modifications add little or no visual variety to the area. 0	Modifications are so extensive that scenic qualities are for the most part nullified or substantially reduced. -4

INSTRUCTIONS

Purpose: To rate the visual quality of the scenic resource on all BLM managed lands.

How to Identify Scenic Value: All Bureau lands have scenic value.

How to Determine Minimum Suitability: All BLM lands are rated for scenic values. Also rate adjacent or intermingling non-BLM lands within the planning unit.

When to Evaluate Scenic Quality: Rate for scenery under the most critical conditions (i.e., highest user period or season of use, sidelight, proper atmospheric conditions, etc.).

How to Delineate Rating Areas: Consider the following factors when delineating rating areas.

1. Like physiographic characteristics (i.e., land form, vegetation, etc.)

2. Similar visual patterns, texture, color, variety, etc.

3. Areas which have a similar impact from cultural modifications (i.e., roads, historical and other structures, mining operations, or other surface disturbances).

Explanation of Criteria
(See Illustration 5.)

NOTE: Values for each rating criteria are maximum and minimum scores only. It is also possible to assign scores within these ranges.

SCENIC QUALITY

A= 19-33
B= 12-18
C= 0-11

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date	8 February, 1980
District	Las Vegas
Planning unit	Clark County
Scenic quality rating unit	SQRU-001

1. Evaluators *(names)*
Bill Civish-Area mgr. SERA   Pete Ertman-Geologist SERA
Bob Taylor-District Landscape Architect

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	LARGE, ROUNDED, BLOCKY SANDSTONE BOULDERS AND PANELS-SHEER CANYON WALLS-MASSIVE SCALE	LOW ON BENCHES TO ROUNDED AND PYRIMIDAL TALL RIPARIAN TREES	HOUSES, BARNS, FENCES, AND POWER POLES IN SOUTH HALF OF UNIT
LINE	STRONG VERTICALS AND DIAGONAL EROSION PATTERNS-CROSSBEDDING IN THE CALICO HILLS-HORIZONTAL ROCK OUTCROPPINGS-SOME ROLLING LINE	TALL VERTICAL PONDEROSA IN CANYONS-RIPARIAN VEGETATION OCCURS IN LONG CURVING LINES	VERTICALS, HORIZONTALS BUT NOT DOMINANT AND LONG CURVING ROADS
COLOR	BOLD COLORS OF BUFF, CRIMSON AND RUSTS IN STRONG CONTRASTS OCCURING IN BANDS ACROSS THE CLIFFS-DARK GREY CLIFFS OF LA MADRE	DULL BLUE GREY AND CREAM COLORED GRASSES & SHRUBS TO DARK AND BRIGHT GREENS	GREYS, WHITE AND WOOD TONES
TEXTURE	SMOOTH SANDSTONE CLIFFS AND FINELY TEXTURED VALLEY BOTTOMS TO THE VERY ROUGH TEXTURE OF LA MADRE MTN	FINELY TEXTURED EVERGREENS TO THE SOFTER LOOKING GRASSES AND SPINEY YUCCAS	SMOOTH

3. Narrative

The Escarpment runs for approximately twelve miles down the length of the valley and is several thousand feet high, has many deep, short bifurcated canyons providing an environment for some unique and rare vegetation. Ephemeral waterfalls are numerous after the short intense rainstorms that occur and during the spring when snows higher up begin to melt. Numerous unusual and interesting erosional patterns and features are found at all levels in the Red Rocks. A 13 mile long scenic loop was constructed to afford the public the opportunity to view the Escarpment up close. Spring Mountian Ranch State Park and the Bonnie Spring and Oliver ranches are in the southern end of the RRCRL. A single pole power line serves the ranches. A dump south of the Oliver Ranch is screened from view by a series of low limestone hills.

4. SCORE *(Circle Appropriate Level)* *

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1	
b. Vegetation	5	3	1	
c. Water	5	3	0	
d. Color	5	3	1	
e. Influence	5	3	0	
f. Scarcity	6	2	1	
g. Cultural Modification	2	0	-4	
TOTALS	16 +	6 +	0 =	22

SCENIC QUALITY CLASSIFICATION

- [X] Class A – 19–33
- [ ] Class B – 12–18
- [ ] Class C – 11 or less

* *See Scenic Quality Rating Criteria in BLM Manual Section 8411*

Form 8400–1 (September 1978)
U.S. Government Printing Office-1978-779-309/108

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date: 8 February, 1980
District: Las Vegas
Planning unit: Clark County
Scenic quality rating unit: SQRU-002 Pine Creek Canyon

1. Evaluators *(names)*
Bill Civish-Area Manager SERA Pete Ertman-Geologist SERA
Bob Taylor-District Landscape Architect

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	Sheer canyon walls and large round boulders, small perennial stream and small falls and many pools.	Tall conical pines, masses of shrubs and bushes	none
LINE	Vertical fractures and horizontal bedding of sandstone formations	tall vertical pines twisting and winding branches of manzanita and other shrubs.	none.
COLOR	Shades of maroon and buff sandstone layers in horizontal band dark desert varnish staining cliff walls water streaked waterfalls.	Deep lush greens of all shades, some are highly glossy others are more subltle	none
TEXTURE	Smooth to finely textured sandstone with some slightly rougher texture on the slopes at the canyon mouth.	Very smooth to soft finely textured	none.

3. Narrative
This rating unit is within the larger SQRU-001 rating unit and has been differentiated from the other canyons because of the rich diversity of vegetation which is found in the canyon, some forms occur nowhere else in the world. The north fork of the canyon has been set aside by PLO 3530 for protection of the unique geological, botanical and other unique and irreplaceable resources. The area qualifies for protection under VRM Class I, as an ACEC.

4. SCORE *(Circle Appropriate Level)**

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1	
b. Vegetation	5	3	1	
c. Water	5	3	0	
d. Color	5	3	1	
e. Influence	5	3	0	Part of the Escarpment
f. Scarcity	6	2	1	
g. Cultural Modification	2	0	-4	
TOTALS	17 +	8 +	0 =	25

SCENIC QUALITY CLASSIFICATION

- [x] Class A – 19–33
- [ ] Class B – 12–18
- [ ] Class C – 11 or less

* *See Scenic Quality Rating Criteria in BLM Manual Section 8411*

Form 8400–1 (September 1978)
U.S. Government Printing Office-1978-779-309/10

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 02-07-80

District Las Vegas

Planning unit Clark Co.

Scenic quality rating unit 003-Brownstone Canyon

1. Evaluators *(names)*

William T. Civish, Area Manager, SERA Peter Ertman, Geologist, SERA
Robert Taylor, District Landscape Architect

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	Large rounded and blocky Aztec sandstone boulders in isolated groups flat alluvial washes	Rounded, conical and low shrubs at the base of sandstone.	Arched dam about six feet high and twenty feet long, 3 feet across
LINE	Vertical and horizontal fractures and crevices, interesting cross-bedded patterns, strong line where color changes.	None dominant, fairly uniform.	Long sweeping arc.
COLOR	Many subtle color variations within a single color, maroons and buffs dominate one color will abruptly stop and another start.	dark olive greens and blue-greys with a light cream colored understory	same color as the sandstone formations.
TEXTURE	Very finely textured, appears smooth when seen from a short distance to coarse with many holes in some areas glass smooth water.	Finely textured to a medium texture on the larger plants	Rough surface.

3. Narrative

BROWNSTONE BASIN:
This basin is at the northern end of the Red Rocks Canyon Recreation Area, but is not accessible from the scenic loop, access is via a low grade jeep trail up an old wash. Much of the land in this rating unit is privately owned by Summa Corporation. This relatively narrow and long valley opens to the Las Vegas valley on the east and ends in the talus foothills of La Madre Mountain. Many interesting Aztec sandstone formations occur in the valley and on the slopes of the enclosing foothills. Light buff sandstones overlay the dark maroon sandstones with one color abruptly ending and the other beginning, many narrow bands of color can be found within the rocks. Interesting and unusual forms have been carved out of the sandstone by wind and water over the years. A small dam at the upper portion of the canyon is a refreshing oasis in this dry canyon and is a favorite place for recreationists. Many petroglyphs and pictographs can also be found in the canyon and are not vandalized too badly to date.

4. SCORE *(Circle Appropriate Level)* *

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1	
b. Vegetation	5	3	1	
c. Water	5	3	0	
d. Color	5	3	1	
e. Influence	5	3	0	
f. Scarcity	6	2	1	
g. Cultural Modification	2	0	-4	
TOTALS	12	+ 8	+ 0	= 20

SCENIC QUALITY CLASSIFICATION

- [x] Class A – 19–33
- [ ] Class B – 12–18
- [ ] Class C – 11 or less

* *See Scenic Quality Rating Criteria in BLM Manual Section 8411*

Form 8400–1 (September 1978)

U.S. Government Printing Office-1978-779-309/108

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 02-07-80
District Las Vegas
Planning unit Clark Co.
Scenic quality rating unit 004-Spring Mtn. (LaMadre Mtn.)

1. Evaluators *(names)*
William Civish, Area Mgr. SERA   Peter Ertman, Geologist, SERA
Robert Taylor, District Landscape Architect

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	steep, heavily dissected and erroded foothills, sheer cliffs, narrow valleys, rolling foothills, high mtns.	rounded and conical dense goupings in canyon bottoms	ranch buildings with metal out buildings power poles
LINE	jagged peaks and long oblique ridge lines, some long limestone outcrops cut across sides of hills	some verticals in the taller vegetation in canyons	vertical poles and sagging pwerlines.
COLOR	grey limestone soils with some isolated incl-sions of red soils	dark greens with light blue-grey sagebrush understory	white, tans and light blue
TEXTURE	smooth to medium some large areas of very coarse limestone outcroppings	fine to coarse	smooth

3. Narrative

THE SPRING MOUNTIAN RANGE:
This rating unit extends up from the valley floors to the Forest Svs. boundary and includes almost all the pinyon-juniper forest areas from Mt. Sterling to Potosi Mtn. Many small canyons are found within this rating unit some have dense stands of vegetation, there is almost no water to be found in any of the canyons except for ephemeral waters. During the winter many portions of the rating unit will be covered under a blanket of snow. Many campers, hunters, hikers and outdoor enthusiasts use this area to beat the heat of the valley and escape to the higher mountians and fresh air. Sky Mountian ranch is about half way up Lovell Canyon and consists of several light blue metal Butler type buildings and several sand colored block buildings and a small chapel on a knoll. The buildings are not very dominant in the landscape. The small village of Mountian Springs is in the southern end of the rating unit and is a collection of homes just off the highway in the juniper covered hills.

4. SCORE *(Circle Appropriate Level)* *

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1	
b. Vegetation	5	3	1	
c. Water	5	3	0	
d. Color	5	3	1	
e. Influence	5	3	0	
f. Scarcity	6	2	1	
g. Cultural Modification	2	0	-4	
TOTALS	0 +	11 +	1 =	12

SCENIC QUALITY CLASSIFICATION

- [ ] Class A – 19–33
- [x] Class B – 12–18
- [ ] Class C – 11 or less

* *See Scenic Quality Rating Criteria in BLM Manual Section 8411*

Form 8400–1 (September 1978)
U.S. Government Printing Office-1978-779-309/108

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SCENIC QUALITY FIELD INVENTORY

Date 02-07-80
District Las Vegas
Planning unit Clark Co.
Scenic quality rating unit 005-Blue Diamaond Hill

1. Evaluators *(names)* William Civivsh, Area Mgr. SERA Peter Ertman, Geologist SERA
Robert Taylor, Dist. Landscape Architect

2. LANDSCAPE CHARACTER *(Feature)*

	a. LANDFORM/WATER	b. VEGETATION	c. STRUCTURE *(General)*
FORM	drumlin hills with steep cliffs on one side, well drained on the other shallow valleys in between	very small, almost not noticeable, rounded	many residences, power power lines, railroad gypsum plant, mine tunnels
LINE	some horizontal bands of limestone warped and twisted by the forces of nature	none	vetricals and horizontals roads winding up the face of the hills.
COLOR	grey with white exposed gypsum on top of Blue Diamond Hill, some red soils exposed on lower hills where mining is taking place	grey-green and light cream	blue, white, red, green grey and many other pastel colors
TEXTURE	coarse to smooth in the valley littered slopes	soft	smooth

3. Narrative

BLUE DIAMOND HILL:

Within this unit are the foothills west of Las Vegas that seperate Red Rocks from the urbanized areas of west Las Vegas. A large strip mining operation is on the top of Blue Diamond Hill where gypsum is extracted to make wallboard at the Flintkote plant at the toe of the hill. The white scar on the top is visible from many locations in the Red Rocks but reflects the basic forms, line and texture of the rating area, only the color of the exposed soils are different. Mining of the hills east of the gypsum mine takes the form of tunneling into the base of one hill exposing the underlying red soils and leaving highly visible holes evenly spaced along the foot of the hill and a road cut across the face of the hill connecting each of the large tunnels. The area is not to heavily populated, with a number of homes just off the Pahrump highway, in the immediate foreground. The community of Blue Diamond is also in the rating unit. Most of the rating unit is undisturbed however, two areas are recommended for VRM Class IV ratings as the result of present management activities, they are the Flintkote mining operation and the Blue Diamond dump. The dump can meet the overall management criteria for the rating unit through

(over)

4. SCORE *(Circle Appropriate Level)* *

	HIGH	MEDIUM	LOW	EXPLANATION OR RATIONALE
a. Landform	5	3	1	
b. Vegetation	5	3	1	
c. Water	5	3	0	
d. Color	5	3	1	
e. Influence	5	3	0	
f. Scarcity	6	2	1	
g. Cultural Modification	2	0	-4	
TOTALS	5 + 6 + 2 = 13			

SCENIC QUALITY CLASSIFICATION

- [ ] Class A – 19–33
- [X] Class B – 12–18
- [ ] Class C – 11 or less

* *See Scenic Quality Rating Criteria in BLM Manual Section 8411*

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rehabilitation when it is closed, the probability for success is relatively high. However the mine will take a great deal of planning and work to meet the overall management objective of the rating unit. The probability for success is relatively low as the mine lies on patented mining claims.

APPENDIX G

THE BUREAU OF LAND MANAGEMENT'S VISUAL RESOURCE MANAGEMENT SYSTEM

THE BUREAU OF LAND MANAGEMENT'S VISUAL RESOURCE MANAGEMENT SYSTEM

The following overview of the Bureau's Visual Resource Management System is taken from a paper presented by Robert W. Ross, Jr., the BLM's chief Landscape Architect, at the National Conference on Applied Techniques for Analysis and Management of the Visual Resource held at Incline Village, Nevada, April 23-25, 1979.

Understanding and managing the visual aspects of alterations to the natural landscape are particularly important to the BLM, because many of the activities taking place on its lands involve some degree of alteration. Recent legislation, the Federal Land Policy and Management Act of 1976 (FLPMA), set basic policy for the BLM's management of public lands. The key requirements are contained in section 102(8), which states that:

"The public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use."

The Act, thus, makes protecting scenic and other environmental values an explicit criterion that must also be applied throughout the BLM's land management activities.

FLPMA also places new emphasis on the role of land use planning by requiring that resource management plans "give priority to the designation and protection of areas of critical environmental concern."

The criteria for identifying these areas are stated in the definition section 103(a):

".....area..... where special management attention is required...to protect and prevent irreparable damage to important historical, cultural, or <u>scenic</u> values, fish and wildlife resources or other natural systems or proceseses or to protect life and safety from natural hazards."

The National Environmental Policy Act of 1969, which seeks to provide aesthetically pleasing surroundings for all Americans, calls for the development of procedures to ensure that presently unquantified environmental values are given appropriate consideration in decisionmaking.

It also requires, "utilization of a systematic, interdisciplinary approach, which will ensure the integrated use of...environmental design arts in planning and decisionmaking.

The Surface Mining Control and Reclamation Act of 1977 makes minimizing adverse effects on visual resources a requirement for all surface mining activities.

The Clean Air Act amendments of 1977 also establish the importance of scenic values in determining airshed classifications and managing air quality.

In conjunciton with its land planning and management responsibilities, the BLM is committed to managing visual resources and concurrently, to minimizing the adverse visual impacts of land use practices on its lands. As a result, the BLM requires that visual resource considerations be included in all environmental assessments, in all land use planning decisions, and in the implication of all resource projects.

Because the scenic value of public lands varies, however, and because management objectives also vary, it is not practical to provide a uniform level of protection to all the BLM lands. The BLM has, therefore, developed a system for evaluation visual resources and for determining what degree of protection, rehabilitation, or enhancement is desirable and possible. This Bureauwide system has been developed to provide an interdisciplinary approach to the visual resource management process. The system, which is integrated into the BLM procedures for "Multiple-Use Planning and Environmental Analysis" insures that principles of the environmental design arts are applied to all activities on the BLM land that may modify the landscape.

The BLM's Visual Resource Management (VRM) System is an analytical process that identifies, sets, and meets objectives for maintaining scenic values and visual quality.

The system is based on recent research that has produced ways of assessing aesthetic qualities of the landscape in objective, universally recognizable terms. what has been considered extremely subjective (aesthetic judgement, particularly in the landscape) was found to have identifiable consistent qualities which can be described and measured, and about which people with diverse opinions will tend to agree. Whatever the terrain (and whoever the observer), perception of visual quality in a landscape seems to be based on several common principles including:

Landscape character is, for the most part, determined by the four basic visual elements of FORM, LINE, COLOR, TEXTURE. Although all four elements are present in every landscape, they exert varying degrees of influence.
The stronger the influences exerted by these elements, the more interesting the landscape.

The more visual variety in a landscape, the more aesthetically pleasing that landscape. Variety without harmony, however, is unattractive, particularly in terms of manmade alterations (cultural modifications) that are made without care.

The BLM incorporates these and other principles in a broad program for managing visual resources.

The VRM program functions in these three ways:

First, the program initiates the inventory and evaluation of visual resources on all lands under the BLM jurisdiction (<u>Inventory/Evaluation</u>). Once inventoried and analyzed, these lands are given relative scenic value ratings. Action plans are then developed for improving or preserving the scenic values of each parcel.

Second, the VRM program responds when development is proposed on the BLM land, either by the Bureau itself (through its multiple-use planning activities), or by private parties. Proposed development is measured against VRM scenic quality classes through the Contrast Rating process (<u>Environmental Assessment for Visual Resources</u>).

Similarly, VRM standards and techniques can be used when proposed activities are still in the design stage to determine in advance, the visual impact of an activity and the extent to which mitigation measures will be required to make a project acceptable (<u>Visual Resource Designs</u>).

Third, the VRM program functions on a support level; through the development of graphic simulation techniques to model visual impacts, through monitoring actual visual impacts of new development activities, and through the publication of technical reports (such as the guidebooks in this series) that disseminate current information on the program (<u>Support Elements/Monitoring and Compliance</u>).

INVENTORY/EVALUATION

Devaluation of the visual quality of the landscape, the sensitivity of that landscape to change, and distance determine classes in the Visual Resource Management system. Although the details of the evaluation process itself is quite straightforward.

SCENIC QUALITY

Scenic quality is perhaps best described as the overall impression one retains after driving through, walking through, or flying over an area of land. When scenic quality is inventoried, an area is first divided into sub-units that appear generally homogenous in terms of land forms and vegetation. Each area is rated by seven key factors according to a consistent point system that allocates specific values to three levels of dominance for each factor.

The sum of the rating scores assigns each landscape to one of three Scenic Quality Classes: Class A = 19-33; Class B = 12-18; Class C = 0-11.

SENSITIVITY LEVELS

Although landscapes do have common elements that can be measured, there is still a subjective dimension to landscape aesthetics - every viewer brings to the landscape perceptions formed by individual influences: culture, visual training, familiarity with local geography, and personal values.

To measure regional and individual attitudes for inclusion in the evaluation of a landscape, visual sensitivity is determined, in two ways:

Use Volume - Travel through an area (by road, trail, river) and the use of that area (for recreation, camping, events) are tabulated and then assigned a high/medium/low rating according to predetermined classifications.

User or Public Attitudes - Public groups are invited to workshops where they are familiarized with the landscape area, and then asked to respond to activities that will modify that landscape. The concern they express about proposed changes in scenic quality is rated as high, medium, or low.

A matrix then combines use volume and user attitudes in an overall Visual Sensitivity Rating of high, medium, or low.

DISTANCE ZONES:

The scenic quality of a landscape, user attitudes (and, therefore, the modifications acceptable or desirable) may be magnified or diminished by the visibility of the landscape from major viewing routes and key points. In the VRM system, a landscape scene may be divided into three basic "distance zones."

Foreground/Middleground - What is visible to an observer at a distance of 3 to 5 miles. At the outer boundary of this zone, the texture and form of an individual plant are no longer seen.

Background - What is visible to an observer at a distance of 3-5 to 15 miles, excluding objects perceived only by form or outline. Vegetation included in this zone should be visible, at least, 1 as patterns of light and dark.

Seldom-Seen - What is visible to an observer beyond a distance of 15 miles or is obscured from view at closer range.

Atmospheric conditions may modify the perception of each distance zone. Also where several routes exist, what is foreground from one route may be background from another. (Usually, the closer designation is used.)

For small projects, infield photographic assessment of distance zones is usually sufficient. For large projects, however, or projects that require evaluation from many key viewpoints, an alternative method for generating distance zone data is a computer graphic modeling technique such as the VIEWIT system developed by the USFS.

MANAGEMENT CLASSES

Visual resource Management Classes describe the different degrees of modification allowed in the basic elements of the landscape. In practice, the Management Class designation is derived from an overlay/matrix evaluation techniqe that identifies areas with similar combinations of factors and then assigns them to a VRM class according to predetermined criteria.

The resulting map of contiguous areas sharing the same VRM class is an important planning document for all BLM land-use decisions. It is used in the BLM's multiple-use planning process, then becomes the basis for developing visual resource management objectives, and is also used to assess the visual impact of proposed development activities.

Of the six classes, one is the Areas of Critical Environmental Concern (ACEC) and the remaining five are the established five classes: ACEC's and the remaining five are the established five classes: ACEC's are lands of high scenic value and relative scarcity.

Class I. This class provides primarily for natural ecological changes; however, it does not preclude very limited management activity. Any contrast created within the characteristic environment must not attract attention. It is applied to wilderness areas, some natural areas, wild portions of the wild and scenic rivers, and other similar situations where management activities are to be restricted.

Class II. Changes in any of the basic elements (form, line, color, texture) caused by a management activity should not be evident in the characteristic landscape. A contrast may be seen, but should not attract attention.

Class III. Contrasts to the basic elements (form, line, color, texture) caused by a management activity may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.

Class IV. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, texture) inherent in the characteristic landscape.

Class V. Change is needed, or change may add acceptable visual variety to an area. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding landscape. This class would apply to areas identified in the scenic evaluation where the quality class has been reduced because of unacceptable cultural modification. The contrast is inharmonious with the characteristic landscape. It may also be applied to areas that have the potential for enhancement, i.e., add acceptable visual variety to an area/site. It should be considered an interim or shortterm classification until one of the other VRM class objectives can be reached through rehabilitation or enhancement. The desired visual resource management class should be identified.

CONTRAST RATING SYSTEM

A measure of the ease with which a proposed activity can be inserted into a landscape is the contrast of that activity with the basic elements of the landscape. Assessing the contrast of a proposed project against the form, line, color, and texture of the existing setting is a simple, but effective demonstration of the modifications that may be required to meet a desired landscape quality.

To accomplish this, the BLM Contrast Rating procedure is applied to all proposed development and management activities. This procedure first breaks a landscape down into its major features (land and water, vegetation, structures) and each feature, in turn into its basic elements (form, line, color, texture). Assessing the predicted contrast of a proposed activity against each feature in the landscape readil;y indicates the anticipated severity of visual impact.

In the Contrast Rating system, the ease of detecting contrast in the basic elements ranges from the highest rated (form) to the lowest rated (texture). By assessing degrees of contrast in each of the major features, a multiplier can be derived that indicates intensity of contrast.
More specifically, there are acceptable maximum ratings for each element, and any one feature for each visual resource management class.

Since each activity proposed for BLM land must pass through this evaluation, it has the potential to be useful in order to identify and mitigate extreme contrasts in the planning/design stage.

APPENDIX H

RECREATION METHODOLOGIES

RECREATION METHODOLOGIES

All use calculations are based on a 1976 NDSP Survey which determined that an average of 3.5 persons were in vehicles being used for outdoor recreation purposes. The recreation use figures were derived from several traffic counters. A BLM traffic counter on the Scenic Loop Road was the source of the 1973-1978 figures there. 1979 Scenic Loop visitation was derived from a NDSP counter near the loop entrance. A Nevada Department of Transportation (NDT) traffic counter on West Charleston Boulevard south of the entrance to the Scenic Loop Road was used for 1973 and 1979 figures there. It was assumed that 75% of the vehicle traffic was recreational (based on observations by BLM and NDSP rangers).

Pahrump Highway figures also came from a NDT counter. It was assumed that 25% of the average daily traffic count of 1,860 was recreational (based on BLM and NDSP ranger observations).

"1979 RRCRL Visitation at Specific Sites," figures were derived from NDSP traffic counters at Red Springs, Sandstone Quarry, Whiterock Spring, on the Scenic Loop, and from patrol logs maintained by BLM and NDSP rangers.

RRCRL oil and gas EA team members visited the Mobil exploratory well on Mormon Mesa in January, 1980.

Weather that day was clear and sunny with calm winds. Temperature at the time of the visit was about 70°F.

Two team members walked away from the drilling site in several directions until they could no longer hear noises or smell odors associated with the drilling operation. This distance was determined by pacing to be about 1/4 mile.

APPENDIX I

PROPOSED DESIGNATION OF EXISTING RIGHT-OF-WAY CORRIDOR

PROPOSED DESIGNATION OF EXISTING RIGHT-OF-WAY CORRIDOR

The Public Lands Included in an Area:

a) 5,280 feet (1 mile) in width west and south of the centerline of the Department of Energy (DOE) 750 KV transmission line right-of-way Nev 065524 beginning at a point in the NW1/4NW1/4 of Section 2, T.15S., R.48E., MDM where the centerline of DOE 750 KV transmission line right-of-way Nev 065524 intersects U. S. Highway 95, thence in a southeasterly direction to a point in the SW1/4NW1/4 of Section 28, T. 22S., R. 57E., MDM where the centerline of DOE 750 KV transmission line right-of-way Nev 065524 intersects Nevada State Highway Department right-of-way Nev 011798 (Pahrump Highway), thence

b) continuing east 5,280 feet in width south of the centerline of Nevada State Highway Department right-of-way Nev 011798 to a point in the NW1/4NE1/4 of Section 34, T.22S., R.58E., MDM where the centerline of DOE 750 KV transmission line right-of-way Nev 065524 intersects the Nevada State Highway Department right-of-way Nev 011798, thence

c) Continuing east 5,280 feet in width south of the centerline of the DOE 750 KV transmission line right-of-way Nev 065524 to a point in Lot 3 of Section 18, T.23S., R.63., MDM where the centerline of the DOE 750 KV transmission line right-of-way Nev 065524 intersects with the Los Angeles Department of Water and Power Navajo-McCullough 500 KV transmission line right-or-way N-4790.

APPENDIX J

DEPARTMENT OF AGRICULTURE'S VIEWIT COMPUTER PROGRAM

DEPARTMENT OF AGRICULTURE'S VIEWIT COMPUTER PROGRAM

VIEWIT is an analysis tool for delineating the terrain visible from any number of observer points, up to 50 per map analysis. VIEWIT can also be used to prepare slope maps, for user specified slope classes, aspect analyses, and elevation models. The results may be printed out in either tabular or overlay map form. Additionaly, the system can combine several analyses of the seen area with aspect relative to the observer point and weighted by the distance to seen areas from identified observer points. Ranking of observer positions by importance is also possible with the VIEWIT computer program.

The VIEWIT system was developed in 1968 by the pacific southwest Forest and Range Experiment station at Berkeley, California for use by the U.S. Forest Service as a management and land use planning tool. The system has been applied to various projects including: transportation system alternatives, timber harvesting, mining, and recreation developments.

The Bureau of Land Management, Montana State Office, used the VIEWIT system to map the scenic boundaries and Visual Vulnerability of the Wild and Scenic Upper Missouri River. This was the fist time the BLM used VIEWIT or any other computer program to study a Wild and Scenic River.

VIEWIT provides capabilities to analyse digital terrain data and cause various user-requested operations to be performed. The digital terrain data used for the RRCRL is a grid system. Each cell is 1/5" long by 1/6" high and translates to a scale of 333' x 400', or an area of 3.1 acres per grid cell when the output data is requested in a scale of 1:24000, the standard USGS 7-1/2 minute quadrangle map. The grid cell elevation base is acquired from the Defense Mapping Agency (DMA).

DMA data is interpolated from USGS 1:250,000 scale maps and kept on tape files. Each tape file contains elevation data for either the east or west map-half, an area 1° in latitude by 1° in longitude.
The DMA files specify elevation data on a 200' by 200' grid. VIEWIT cannot use DMA data directly so the TOPAZ computer program COPYNCIC is used to convert the data to the 333' by 400' grid cell size.

Error margins for DMA data are generally insignificant when used in steep topograhpay. However, some loss of detail occurs in the low valley areas due to truncation of elevation data. The characteristic topographic averaging tends to average out extremes in elevation and slope data generated tends to be minimums.

The viewshed analysis benefits from topographic averaging in that the viewshed mapped is a maximum viewshed.

DMA information has a maximum horizontal deviation of no more than one grid cell or 400 feet in any direction. As specified, the vertical dimension may be off by no more than 100 feet

Some of the typical VIEWIT outputs used for planning purpose are:

1. Express in tables showing square miles, acres, and hectares the area within the study unit that can be seen from any single point on the ground or at any point above the ground level. Map the location of these seen areas.

2. Express the above information in composite form from many viewing points within the study area (viewing points may represent alternative roads, trails, or other development systems). Map these seen areas on a numerical printout which indicates the number of times each cell is visible from the viewing points. Map these seen areas on a gray scale printout which shows all cells visible from 0 to 9 and more than nine times seen in shades of gray. Map these seen areas as a percentage of times each cell is seen from the total number of observer positions, and print out in numerical or gray scale maps or both, thereby providing further mapping refinement to cells seen more than 10 times.

3. Evaluate only a portion of a study area (sub-rectangle) to save time and funds.

4. Evaluate only specified sectors of view such as 0° to 90°, 180° to 220°, or combinations of sectors.

5. Evaluate only user-specified classes for slope, aspect and elevation analyses.

6. Develop distance-weighting tables, numeric maps, and gray shade maps. This weighting can be adjusted to allow for up to 20 changes in the distance weights. Weights may relate to foreground, middleground, and background distances or weights may be specified to give greater weights to middleground or the middle areas. It can be done for one viewing point or for many.

7. Develop combined distance, "aspect relative to the observer" and times-seen tables, numeric maps, and gray shade maps. These three functions combined measure the relative visual magnitude of each grid cell or the "visual perception sensitivity" of each cell.

Additional description of system capabilities can be found in U. S. Forest Service General Technical Report PSW-11, 1975, by Michael Travis et al, VIEWIT: Computation of Seen Areas, Slope and Aspect for Land Use Planning.

APPENDIX K

LEGAL REQUIREMENTS FOR PROTECTION OF CULTURAL RESOURCES

LEGAL REQUIREMENTS FOR PROTECTION OF CULTURAL RESOURCES

The BLM hs a legal obligation to ensure that all BLM projects and BLM-assisted or licensed projects (1) give adequate consideration to cultural resources, and (2) do not inadvertently harm or destroy cultural resources.

The primary authority for the protection and mitigation of sites or areas which may be impacted are (1) the 1906 Antiquities Act, (2) the 1966 National Historic Preservation Act, (3) the 1969 National Environmental Policy Act, (4) Executive Order 11593, (5) the 1974 Archaeological and Historic Preservation Act, and (6) the Archagological Resources Protection Act of 1979.

The National Historic Preservation Act established the National Register of Historic Places and the President's Advisory Council on Historic Preservation Section 106 of this Act requires that Federal, Federally-assisted, and Federally-licensed undertakings affecting cultural resource properties included, or having the potential for being included, on the National Register be submitted to the Advisory Council for review and comment prior to the approval of any such action or any such undertaking by the Federal agency.

The National Environmental Policy Act mandates that part of the function of the Federal government is "to preserve important historic, cultural and natural aspects of our national heritage."

The recent Advisory Council on Historic Preservation procedures (39 FR 18:2.3355-3370; 36 FR 8:800.4) state that, "As early as possible and in all cases prior to agency decision concerning an undertaking, the Agency Official shall identify properties located within the area of the undertaking's potential environmental impact that are included in or eligible for inclusion in the National Register." This process is in compliance with the requirement of Section 106 of the National Historic Preservation Act and Sections 1(3) and 2(b) of Executive Order 11593. The procedures to accomplish this are outlined in the Federal Register of February 10, 1976 (41 FR 18:2.3367).

The first step in this procedure is to identify properties on or nominated to the National Register. This is done by simply consulting the National Register list and the monthly supplements. The complete list of National Register properties and nominations is published in the Federal Register in its entirety every year on the first Thursday in February. The monthly supplements appear in the Federal Register on the first Tuesday of each month.

Section 2(a) of Executive Order 11593 states that Federal agencies shall "locate, inventory, and nominate to the Secretary of the Interior all sites, building, districts, and objects under their jurisdiction or control that appear to qualify for listing on the National Register of Historic Places."

Executive order 11593 directs all Federal agencies to inventory their cultural resources, to submit to the National Register all qualified sites, and to establish procedures for cultural resource preservation in their plans and programs. If the State Historic Preservation Officer does not concur in the BLM's evaluation, procedures outlined in 36 CFR 800 will be followed.

GPO 689-161/80-1001

LAS VEGAS DISTRICT

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