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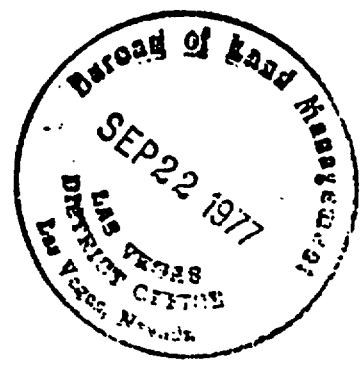
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Mineral Resources in the Vicinity of
the Nellis Air Force Base and the
Nellis Bombing and Gunnery Range,
Clark, Lincoln, and Nye Counties, Nevada

by

John R. Norberg

United States Department of the Interior

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MINERAL RESOURCES IN THE VICINITY OF THE
NELLIS AIR FORCE BASE AND THE NELLIS BOMBING AND GUNNERY RANGE,
CLARK, LINCOLN, AND NYE COUNTIES, NEVADA

by

John R. Norberg ^{1/}

SUMMARY AND CONCLUSIONS

Many mineral commodities are found in the vicinity of the Nellis Air Force Base (NAFB) and the Nellis Bombing and Gunnery Range (NBGR). Gold, silver, copper, lead, zinc, mercury, tungsten, gypsum, limestone, turquoise, sand and gravel and stone have been recovered from study area mines. Occurrences of magnesite, manganese, fluorite, and travertine have been reported in the area, but no production has been recorded. Several warm water springs and wells, which may have potential agricultural and space heating uses, are also found.

The most numerous metal deposits consist of gold-silver minerals, occurring as fissure fillings and replacements in shear zones. The lead-silver-zinc ore bodies of the Groom mine, however, have the most metal. The total output of the Groom mine exceeds \$3.75 million at 1977 prices.

Gypsum and limestone are probably the most valuable commodities produced in the vicinity of the NAFB and the NGBR. The average annual gypsum and limestone output for the early 1960's was estimated at 100,000 and 500,000 tons, respectively.

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Detailed geologic mapping, geochemical sampling, and geophysical surveys are recommended for four of the mineralized areas in the study area. The four areas are:

1. The hydrothermally-altered rocks underlying the Thirsty Canyon Tuff in western Nye County.
2. The skarns or tactites in the Oak Spring mining district.
3. The lead-silver replacements in the Don-Dale mining district near the Bombing Range's eastern boundary in western Lincoln County.
4. The altered and fractured volcanic flows underlying the Fraction Tuff in Kawich Range along the Bombing Range's northern border.

Reconnaissance sampling and mapping of other known mineral areas also are recommended. If initial investigations determine the presence of significant anomalies, more detailed investigation should be undertaken.

INTRODUCTION

Personnel in the Bureau of Mines prepared this report at the request of the Department of the Air Force (DAF), through the Bureau of Land Management (BLM), for a Level I Mineral Survey of the Nellis Air Force Base (NAFB) and the Nellis Bombing and Gunnery Range (NBGR) in southern Nevada (fig. 1). It is designed to provide BLM and DAF

FIGURE 1. - NEAR HERE.

with basic mineral resource data for use in preparing an environmental impact statement covering the continued withdrawal of public lands for military uses. Although the report emphasizes mineral resources, it also provides a brief description of the study area's general geology.

FIGURE 1. - Mountain ranges and basins of southern Nevada in the vicinity of the Nellis Air Force Base and the Nellis Bombing and Gunnery Range.

This study, a library research project, was conducted at the Bureau of Mines' Western Field Operation Center, Spokane, Washington. Primary data were gathered principally from published reports of the U.S. Geological Survey and the Nevada Bureau of Mines and Geology and from unpublished reports, production statistics, and correspondence in the Bureau of Mines files. No on-site field examinations were made.

Because of the extremely short time available for assimilation of data; the preparation of the report; the lack of field reconnaissance and exploration work; and the fact that the area has been closed to mineral entry since 1940, this report provides only ~~sur~~^{ficial} evidence of the potential for development of minerals that could be critical to the national mineral posture.

Due to imprecise data on the location of some mining districts and mineral properties and to uncertainties of the exact borders of the proposed withdrawal, this report covers an area somewhat larger than currently occupied by the Nellis Air Force Base and Bombing Range. The areas covered include: (1) land exclusively used by DAF; (2) land exclusively used by the Desert National Wildlife Range; (3) land jointly used by DAF and the Wildlife Range; and (4) the land used by the Energy Research and Development Administration (ERDA) (fig. 2).

FIGURE 2. - NEAR HERE.

**FIGURE 2. - Mining districts in the vicinity of the Nellis Air Force,
Base and the Nellis Bombing and Gunnery Range, Clark,
Lincoln, and Nye Counties, Nevada.**

PHYSIOGRAPHY

The topography of the NAFB and NBGR is typical of the Basin and Range physiographic province. It is generally characterized by broad, closed basins separated by mesas and narrow north-south-trending mountain ranges (fig. 1) except in the southeastern portion where intermittent streams drain into the Colorado River. Elevations range from less than 2000 feet near Las Vegas to nearly 10,000 feet in the Desert National Wildlife Range, about 35 miles due north of the city. Most mountain ranges, however, average less than 7000 feet with occasional peaks rising above 8000 feet.

GEOLOGY

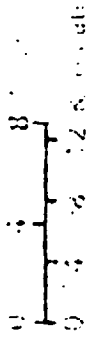
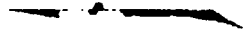
Previous Investigations

Many published works describe the various geological aspects of southern Nevada. The Nevada Bureau of Mines and Geology has published several bulletins which describe the geology and mineral deposits of Clark, Lincoln, and Nye Counties (1, 4, 5, 10) 2/. Other relevant State reports cover State-wide distributions of mineral commodities (2, 6, 8), and the geology of given mining areas (3, 9). The U.S. Geological Survey (U.S.G.S.) has intensively mapped and studied portions of the study area in conjunction with the investigation of the suitability of ERDA Nuclear Testing Facility for underground weapons testing. Unclassified results of these studies have been published by the U.S.G.S. and the Geological Society of America (11, 13, 34, 35).





2/ Underlined numbers in parentheses refer to items in the list of references at the end of this report.

Before

- (1) Antelope Springs
- (2) Arrowhead
- (3) Cactus Springs
- (4) D.K.C.
- (5) Don-Dale
- (6) Eden
- (7) Florence
- (8) Frenchman Mountain
- (9) Gass Peak
- (10) Gold Grater
- (11) Golden Arrow
- (12) Golfeld
- (13) Groom
- (14) Kaidich
- (15) Mellan Mountain
- (16) Mine Mountain
- (17) Oak Springs
- (18) Rapoose
- (19) Silverton
- (20) Stenwall
- (21) Tellico
- (22) Trappers
- (23) Wainwright
- (24) Wellington
- (25) White Caps (?)
- (26) Wilsons



EXPLANATION

-  Historic Forts, Bombs and Cannon - Range
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-  Desert National Wildlife
-  Energy Research and Administration Nuclear

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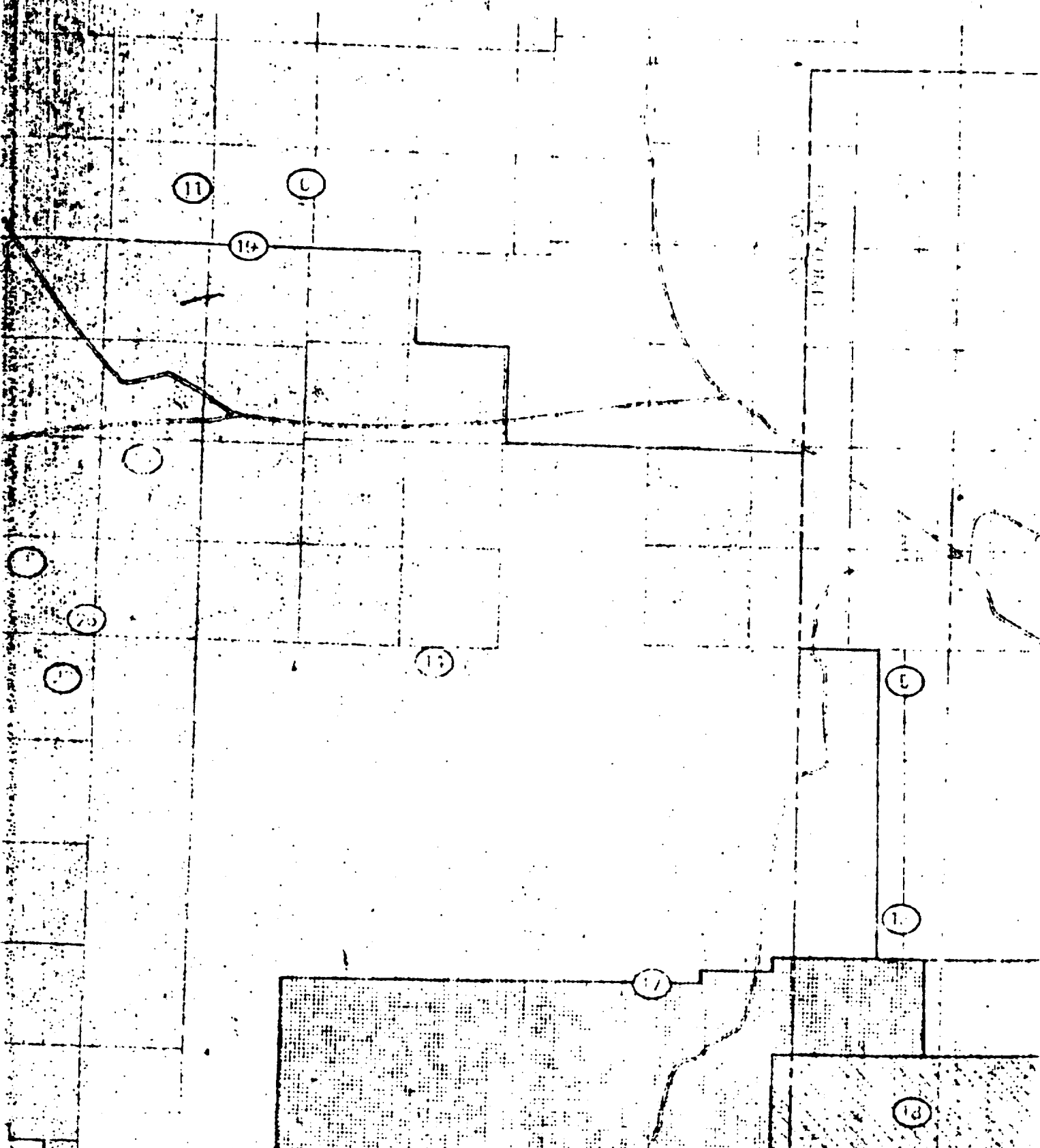
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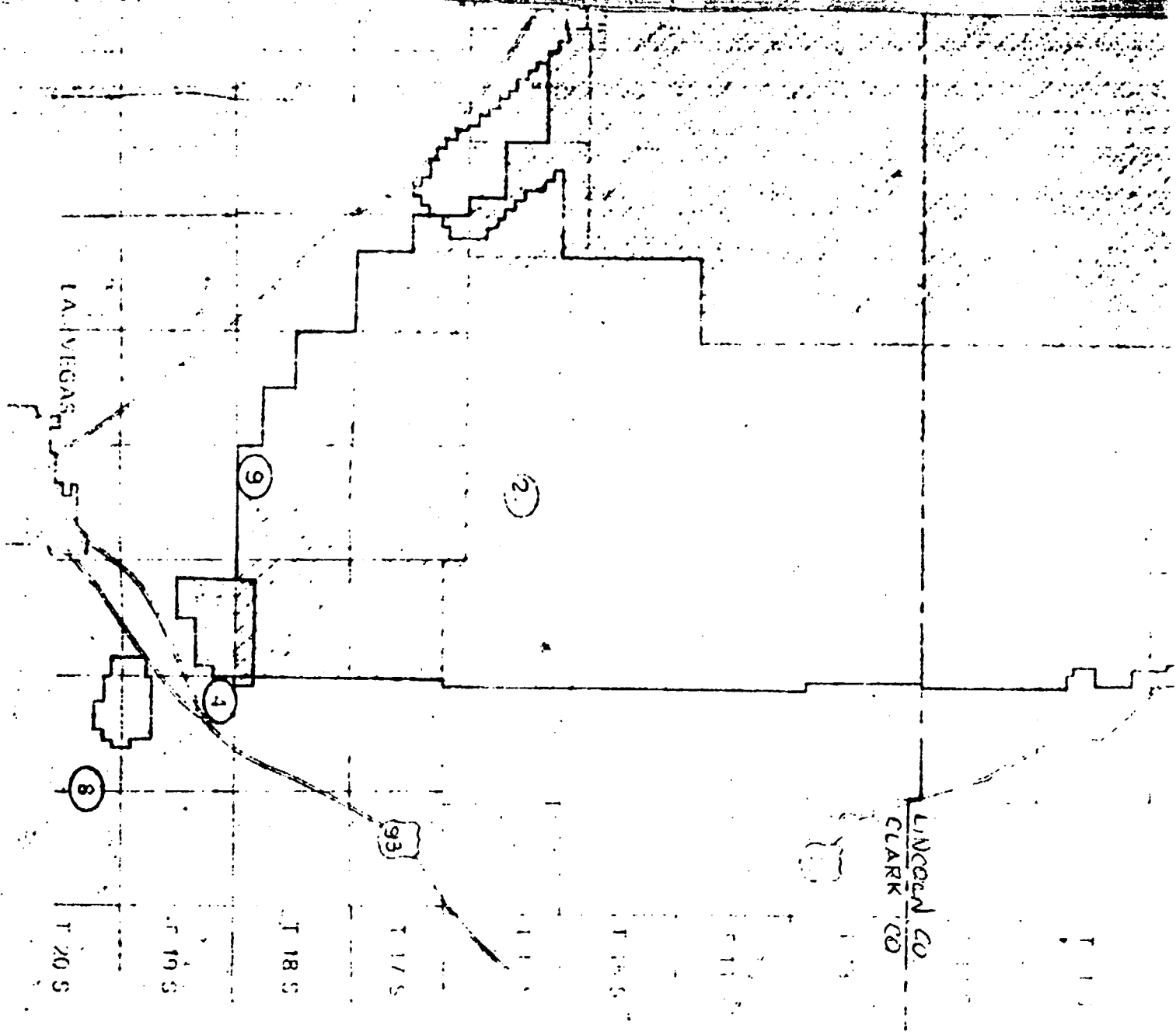
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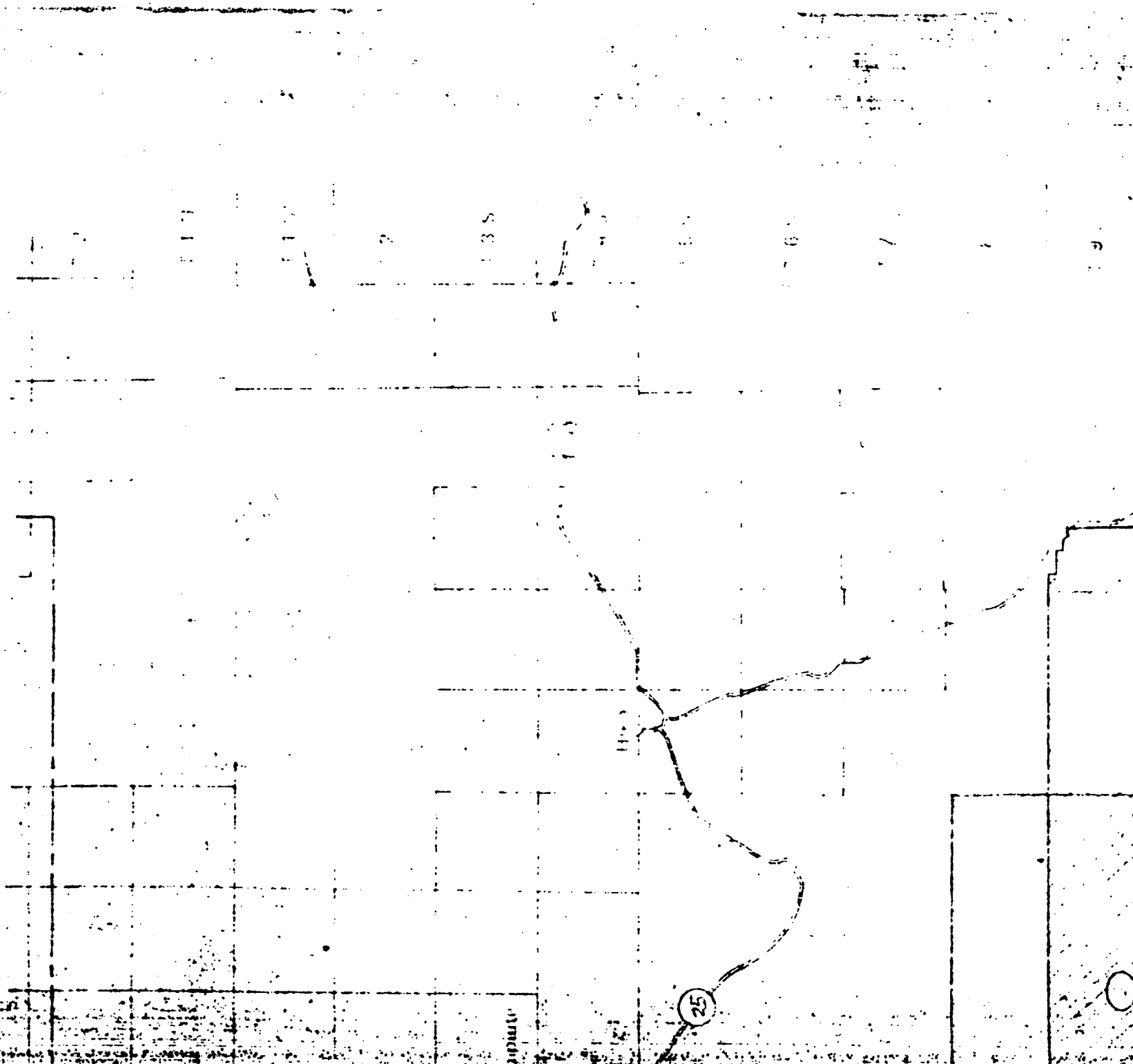
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Rock Units

Rocks representing part of the Precambrian, the entire Paleozoic, and most of the Mesozoic and Cenozoic Eras are exposed within the study area. Most of the area is covered by Cenozoic unconsolidated sediments or Tertiary volcanics. Exposures of Precambrian rocks are minor.

Precambrian Rocks

Precambrian basement rocks are exposed in two places in the study area. Gneissic quartz monzonite and biotite schist crop out in the Trappman Hills area of Nye County, east of Mount Helen, in the western part of the NBGR. The rocks are poorly exposed and form low, rounded hills. The other occurrence, consisting mainly of a complex of schist, gneiss, and coarse-grained igneous rocks, is exposed at the west face of Frenchman Mountain in Clark County, a few miles northeast of Las Vegas. Elsewhere, the Precambrian crystalline rocks are buried deeply.

Although Precambrian sedimentary and metasedimentary rocks are more widespread than the Precambrian crystalline rocks, they still occupy only a small part of the study area. These rocks consist primarily of quartzites, sandstones, shales, limestones, and dolomites, and are exposed in the northwest corner of Stonewall Mountain, on the east side of Cockeyed Ridge near the Lincoln-Nye County line, and on the west side of the Sheep Range in northern Clark and southern Lincoln Counties.

Paleozoic Rocks

All seven periods of the Paleozoic Era are represented in the study area by a thick sequence of marine sedimentary rocks. Longwell reports that the Paleozoic rocks exposed in the ranges north of the Las Vegas Valley in Clark County have a maximum thickness in excess of 26,000 feet (5, p. 14). Tschanz reports that the Cambrian section of the Groom Range in western Lincoln County may well be the thickest Cambrian section in the Great Basin. Although the base of the section is not exposed, the measured portion exceeds 20,000 feet and the complete sequence may be several thousand feet thicker (10, p. 7, 13).

Most of the Paleozoic rocks were deposited in a shallow water miogeosynclinal environment. Although dolomites and limestones are the predominant rock types, quartzites, shales, and argillites are also present.

Mesozoic Rocks

Sedimentary Mesozoic rocks are represented by scattered outcrops of the Triassic Moenkopi and Chinle Formations, the Jurassic Aztec Sandstone, and the Cretaceous Thumb Formation. The Triassic rocks are confined to the eastern portion of the study area in Clark and Lincoln Counties, while outcrops of the Aztec Sandstone and Thumb Formation are restricted to the east side of the Frenchman Mountain in Clark County.

The lower Moenkopi Formation rests unconformably on underlying, Permian rocks and represents the last marine deposition in southern Nevada (5, p. 38-39). The formation consists of a basal conglomerate, shale, fine-grained sandstone, limestone, and dolomite. The Chinle Formation is chiefly composed of fine-grained silty sandstones, siltstones, and shales formed on flood plains, in stream channels, and in lakes. The Aztec Sandstone is primarily composed of fine-to-medium-sized quartz grains weakly cemented by calcium carbonate and iron oxides. The formation exhibits large-scale cross bedding and local ripple marks. The Thumb Formation consists of a basal conglomerate followed by sandstone and siltstone conglomerate, fresh-water limestone, gypsum, and then thin-bedded flagstone. Total thickness is between 2,000 and 3,000 feet.

Mesozoic igneous rocks occur as granitic intrusives and volcanic rocks. A composite stock of hydrothermally-altered granodiorite and quartz monzonite is found at the north margin of Yucca Flat in eastern Nye County. Two other stocks of quartz monzonite composition are located within 8 miles of the first. All three intrude Precambrian and Paleozoic rock and in part are overlain by Tertiary volcanics.

The volcanic rocks are thought to be partly Cretaceous, but they may be as young as Eocene. They consist chiefly of lava flows, mud flows, breccias, and tuffs.

Cenozoic Rocks

The Cenozoic deposits may be categorized into three general types: (1) Tertiary sedimentary rocks; (2) Tertiary volcanics and intrusives; and (3) Quaternary alluvium.

Three sedimentary rock units are exposed in the study area. The Horse Spring Formation, a distinctive rock unit, has a lower member of yellowish siltstone overlain by whitish limestone and other precipitates. The upper member is composed principally of clastic deposits. The formation crops out in the ranges north of Las Vegas, east of Frenchman Mountain, and northwest of Las Vegas near the Nye County line. Beds of the Pliocene(?) Muddy Creek Formation lie unconformably above the Horse Spring Formation. Except in a few fault-disturbed zones, the beds are flat-lying. They crop out in the wide slopes east of Frenchman Mountain and contain abundant gypsum. Small patches of the Titus Canyon Formation, a terrestrial conglomerate and interbedded sandstone, siltstone, limestone, and tuff, are exposed about 6 miles north of Beatty in western Nye County. The formation lies unconformably over the Cambrian Carrara Formation and is, in part, conformably overlain by Tertiary volcanics and associated tuffs.

Tertiary volcanic and associated tuffaceous clastics cover a large portion of the study area. Pyroclastic and welded tuffs are the most abundant, but lava flows, volcanic breccias, and tuffaceous sandstone and siltstone are also common. Cornwall reports that a composite section of all of the volcanic units exceeds 20,000 feet in western Nye County (1, p. 16). This vast quantity of material is thought to have been extruded from up to 10 volcanic centers. The composition of the volcanics is predominantly rhyolitic or dacitic, but andesitic and basaltic rocks also occur. In addition to the Tertiary volcanics, some very young (Quaternary) olivine basalt flows and cinder cones are found. The tops of the young flows and most of the bombs, lapilli, and cinders are brown or red due to their high ferric oxide content.

The Tertiary intrusive rocks occur principally as small granite or diorite stocks and basaltic dikes, sills, and plugs.

A significant portion of the study area is covered by thick, unconsolidated deposits. They blanket about 40 percent of Clark County and one-third of Lincoln County (5, p. 54; 10, p. 78). Ekren reports that approximately half of the northern part of the Bombing Range in Nye County is covered by Tertiary or Quaternary alluvium and colluvium (13, p. 67). These deposits include alluvial fans, talus, sand dunes, playas, landslides, and other detritus. Although the actual depths are not known, the thickest deposits are presumed to be in the major, intermontane basins where depths may be over 2,000 feet. Gravity data for the Kawich Valley and Gold Flat indicate that alluvial fill and volcanics may be up to 4,500 feet thick (13, p. 67). The alluvium varies in composition, texture, and other physical properties with the type of parent material, distance from source, carbonate content, and amount of compaction.

Structure

Pre-Laramide

Geologic evidence indicates that southern Nevada has experienced several periods of structural disturbance. The earliest occurred during the Precambrian when the existing rocks were highly deformed and metamorphosed and were intruded by younger Precambrian granitic rocks. Little detailed information is known of the structural history of the Precambrian other than its extreme complexity (5, p. 60).

The Paleozoic Era was characterized by deposition of a thick sequence of predominantly carbonate sediments in the Cordilleran miogeosynclinal trough. A minor disturbance in the sedimentary sequence occurred during Late Mississippian time. It is evidenced by a slight unconformity at the base of the Bird Spring Formation in the Spring Mountains south of the study area. At the close of Paleozoic time, however, there was a wide-spread uplifting and warping, which in some places indirectly resulted in erosion and the removal of entire formations prior to the deposition of basal Triassic beds (5, p. 60).

Laramide and Post-Laramide

The major period of structural disturbance in the study area, as well as the rest of southern Nevada appears to be related to and contemporaneous with the Laramide revolution in the eastern Cordillera which began during the Late Cretaceous or possibly as late as the Eocene and continued through the Holocene (1, p. 30; 5, p. 60; 10, p. 80). The main structural features include: (1) thrust faults and associated folding; (2) strike-slip or tear faults; (3) volcano-tectonic features; and (4) basin-range normal faults (1, p. 28; 5, p. 61; 10, p. 80).

Thrust Faults

At least two periods of thrust faulting and associated folding have occurred in southern Nevada since the Cretaceous. The major thrusts are related to the Laramide orogeny and are definitely younger than the Triassic and generally are older than Miocene. They forced sheets of older Paleozoic rocks up to 16,000 feet thick as far as 16 miles eastward over younger Paleozoic and Triassic formations (10, p. 2). The overthrusts move along thrust-planes that were generally horizontal and parallel to the bedding of both the overthrust and underlying plates. Most thrusts are the compressional (stretch) type that originated in overturned folds. They moved older rock over younger rocks which are typically folded into overturned synclines beneath the thrusts (10, p. 2).

The younger thrust faults are post-volcanic (post-Oligocene). Their origin is somewhat uncertain and controversial. They have been interpreted as landslides or ecoulements derived from earlier thrust plates, as well as Tertiary thrusts.

Thrust faulting appears to be a major structural control for ore deposition in the Groom district inasmuch as the ore is found in the lower plate near the overlying thrust sheet (10, p. 122).

Strike-Slip Faults

Several prominent strike-slip or tear faults exist in the vicinity of the NAFB and NBRG. The Las Vegas Valley shear zone apparently marks a deep-seated tectonic zone along which right-lateral movement of 25 to 40 miles has occurred (1, p. 30; 34, p. 151). The zone, which developed during Middle Cretaceous time, is recognizable for a distance of about 55 miles. It extends from near Lake Mead on the southeast through the valley north of the Spring Mountains where it passes northwestwardly in an oroflexural bend and disappears in the Spector Range a few miles southwest of Mercury, Nevada. There is suggestive evidence that this zone and the Walker Lane, another transcurrent fault zone west of the study area, along with the Furnace Creek fault zone in Death Valley define a belt of major crustal weakness (13, p. 68; 34, p. 151). Other evidence suggests that Las Vegas Valley and the Walker Lane zones (the Walker Lane Mobile Belt) may have a causal relationship to the volcanic centers in the western portion of the study area.

Three parallel northeast-striking strike-slip faults, known as the Pahrnagat shear system, with apparent left-lateral movement, are found in the northern part of the study area in Lincoln County. The Arrowhead mine fault, a Laramide structure, is the northernmost and is in the vicinity of the Arrowhead mine. It and the Maynard Lake fault are thought to be reactivated portions of much larger right-lateral shear zones comparable to the Las Vegas Valley zone and the San Andreas and Garlock faults in California. The Laramide movement (right-lateral) along the Arrowhead mine and Maynard faults is estimated at about 25 to 30 miles each, while the total post-Miocene displacement (left-lateral) for the entire Pahrnagat system is about 10 miles.

Volcano-tectonic Features

A significant portion of the study area is covered by volcanic tuffs, breccias, and flows. Most volcanic structural features, however, are found in the western part of the study area in Nye County. The features include nine or ten collapsed calderas or grabens with associated domes, elevated blocks, normal faults, and ring fractures (1, pp. 1, 30; 13, p. 68). Several calderas are of great size (1, pp. 32-33): Mount Helen consists of a structural dome within a collapsed area 9 miles wide; Black Mountain, a constructional volcano, was formed in a 4-mile-wide caldera which itself is in an 8-mile-wide collapsed area; and Timber Mountain is a resurgent dome in an oval caldera measuring about 15 by 20 miles. Pahute Mesa is a broad, elevated, nearly flat plateau that conceals a 13-mile-wide caldera (Silent Canyon Caldera) which has collapsed about 5,000 feet.

The only cinder cone in Lincoln County is located about 6 miles north of the Groom mine (10, p. 97).

Basin-Range Normal Faults

Most mountain ranges and intervening basins in the Great Basin province are bounded by normal faults. The faults generally range in age from the Miocene to the Holocene, although a few may be older (1, p. 1; 10, p. 85). They characteristically trend north-south, but locally, northwestward and northeastward trends have been observed. Displacements along frontal faults may amount to several thousand feet (13, p. 70).

High- and low-angle normal faults are also part of the internal structure of many ranges. Again, the trend of these faults is typically north-south. Most have displacements of only a few tens of feet, but several are inferred to have had movement greater than 1,000 feet, and some in excess of 2,000 feet (13, p. 10).

MINERAL RESOURCES

History of Mining

Mining activity in the study area began in the mid-1860's when the four claims that comprised the Groom mine were located. The first attempt to develop the Groom into a commercial operation was unsuccessful primarily due to its isolated location (3, p. 35). The mine remained essentially idle until 1915. Except for several periods totaling seven years, the mine produced continuously from 1915 until 1956.

Most gold-silver deposits were located during the early 1900's. Presumably this was stimulated in part by the discovery of major ore bodies in the Tonopah and Goldfield mining districts near the turn of the century. Several discoveries created their own small-scale "gold rushes," but few prospectors remained after the initial period of activity (4, pp. 11, 69, 91, 162). Although interest in the area's mineral deposits waned shortly after their discovery, activity at some prospects continued sporadically through the 1920's and 1930's.

In October 1940, large portions of Clark, Lincoln, and Nye Counties were withdrawn from further mineral entry and reserved for use as a military bombing and gunnery range. All existing mining claims within the Range were originally leased by the government for a period of five years, with options to renew. Many claims have since been acquired in fee by the United States, but some are still under lease agreements. Claim-holders who have leased their claims to the government retain title, but access to their property is restricted by the commander of Nellis Air Force Base. Hence, there has been little mining activity within the Bombing Range since the beginning of World War II.

Gypsum and limestone have been mined in the vicinity of Nellis Air Force Base in Clark County since the 1930's. Pabco Corporation currently mines and processes gypsum from a quarry in the southeastern part of Frenchman Mountain, while the United States Lime Products Division of the Flinkote Company owns and operates a limestone quarry and associated facilities about 19 miles northeast of Las Vegas. Neither operations are located on military lands.

Production

Total mineral production for the study area is not known, but over half of the properties described in this report are reported to have had some output. Bureau of Mines production records indicate production from 15 of these properties, while the output of the remaining 27 properties is recorded in U.S. Geological Survey or Nevada Bureau of Mines and Geology publications.

Pabco's gypsum quarry and U.S. Lime Products limestone quarry are undoubtedly the study area's largest mineral producers. The Bureau of Mines production records for these operations are considered as confidential company data and thus cannot be revealed. In 1965, Longwell (5, pp. 204-205), however, estimated that the annual output from the gypsum and limestone quarries exceeded 100,000 and 500,000 tons, respectively. Although Longwell did not provide estimates of the production value, it probably is significant.

The Groom mine in Lincoln County is the largest metal producer in the study area. As mentioned previously, Bureau of Mines records indicate that the mine has produced almost continuously from 1915 through 1956. The total mined ore value exceeds \$3.75 million at 1977 market prices.

Production from other metal mines is comparatively small. Individual mine output ranges from less than 20 tons of ore yielding a few ounces of gold and silver to several hundreds of tons of ore yielding several thousand ounces of combined gold and silver, plus appreciable amounts of copper, lead, and zinc. An unknown amount of tungsten (WO₃) concentrates have been produced from the mines in the Oak Spring district near the boundary between the ERDA testing facilities and the bombing range. Sixty-eight flasks of mercury have reportedly been produced from the Black Hawk mercury mine in Kawich mining district. Individual mine production data, subject to withholding of company confidential information, is provided in the mineral property section of this report.

Mineral Deposits

Mining Districts

The mines and prospects discussed in Appendix A are grouped by mining districts. The district names used correspond for the most part with those described by Kral, Longwell, and Tschanz (4, 5, 10). Several properties have been included in nearby districts when the mine or prospect is not in a recognized district. In the absence of a recognized nearby district, this report uses the name of the major mine or a prominent topographic feature as the district name.

The term "mining district" as used in this report represents an indistinct geographic area with topographic, geologic, or historic similarities rather than a legal entity. Some districts consists of a relatively small area with several properties, while others consist of a much larger area with only a few mines, and still others consist of a single, isolated deposit. The symbols on figure 2 show approximate location of the mining districts and do not indicate size of the district, number of properties, or importance of the deposits.

Mode of Occurrence

Most of the area's gold-silver deposits as well as some of the other metallic occurrences are classified as epithermal deposits (10, pp. 114-119). Minerals occur as fissure fillings along faults or fractures or as replacements in shear zones. Epithermal deposits are typically formed at shallow depths (within 3,000 feet of the surface) and at low temperatures (50° to 200° C). Most are found in or near areas of Tertiary volcanism, although a few can be directly related to deep-seated intrusives (9, p. 68). Because of their shallow origin, epithermal deposits are most abundant in younger rocks, but some are found in Cambrian sedimentary rocks.

Silver sulfantimonides and sulfarsenides, gold and silver tellurides, stibnite, cinnabar, native gold, and electrum (a natural alloy of gold and silver) are common epithermal ore minerals. Galena, sphalerite, chalcopyrite, and other mesothermal sulfides are sometimes found in epithermal deposits but rarely in large concentrations. Gangue minerals typically include quartz and/or chalcedony and sometimes calcite, rhodochrosite, barite, or fluorite. High temperature minerals, such as tourmaline, topaz, and garnet, are absent.

Wallrock near epithermal deposits is often highly altered due to the temperature differential between the wall and mineralizing fluids. The alteration products, including pyrophyllite, sericite, chlorite, and silica, often form halos or envelopes parallel to the vein walls. The alteration envelopes may often provide expanded targets for mineral exploration.

Although epithermal fissure fillings and shear zone replacements are the most numerous deposit types in the area, bedded and irregular replacements in limestone account for the bulk of the metals produced. The lead-zinc ores of the Groom district occur as bedded replacements in three thin limestone beds in the Pioche Shale and as irregular replacements along steep fissures in the Lyndon Limestone (10, p. 148). They have characteristics of deposits formed at moderate temperatures (200° to 300° C) and pressures. Galena, sphalerite, chalcopyrite, and tetrahedrite are typical of such mesothermal deposits. Extensive alteration zones may surround mesothermal deposits depending on the country rock in which the ore has been emplaced. Such alteration zones may contain sericite, quartz, calcite, pyrite, and chlorite, but garnet, topaz, tourmaline, and other high-temperature minerals are absent.

The Oak Spring tungsten deposits are found in tactite or skarn zones which have developed along and near igneous-limestone contacts. Skarns, also called pyrometasomatic deposits, selectively replace certain limestone beds. The assemblage of alteration products in a skarn depends on the invaded rock's character and is generally diagnostic and conspicuous. In impure limestones, for example, skarns are characterized by lime-rich minerals such as scheelite, garnet (grossularite and andradite), epidote, tremolite, and plagioclase feldspars. Skarns also provide expanded exploration targets similar to alteration envelopes around epithermal veins.

Mineral Properties

This report describes about 80 mines and prospects (Appendix A) in and adjacent to the Nellis Air Force Base and the Nellis Bombing and Gunnery Range. These properties represent only those deposits that have been reported in geologic literature. They do not include all claims in the study area. The U.S. Army Corps of Engineers, for example, reports that at least 316 individual claims in 105 groups were at one time inside the NBGR (39). Inasmuch as the Range's boundaries have been modified several times since 1940, it is not known how many claims are inside the current boundaries. In addition, several mining districts adjacent to the Range have prospects which have been only casually mentioned in the literature and thus not included in this report.

The mineral property narratives in Appendix A are arranged alphabetically by mining district. They provide data for each deposit concerning its approximate location 3/ and mining district, as well as a synopsis of its geologic setting and mining history.

Map numbers correspond to the mining district location given on figure 2. The MILS sequence number is the property's identification number in the Bureau of Mines Mineral Industry Location System computer file.

3/ The locations must be considered approximate because much of the study area is unsurveyed and because many locations in the literature refer to reference points no longer identifiable.

Other Mineral Resource Occurrences

In addition to the properties described in Appendix A, several construction-aggregate operations and several undeveloped nonmetallic occurrences are found in the study area (36, 37, 38).

Inasmuch as the construction aggregates (sand and gravel, and crushed or broken stone) are high-bulk, low-value, they tend to be produced near the point of consumption. Thus, all major permanent operations are confined to economic hauling distances of Las Vegas. During highway construction, temporary operations are established to provide the needed material, but after project completion, the deposits are usually abandoned.

Sand and gravel is obtained principally from Quaternary valley alluvium or alluvial fans (5, p. 166). The deposits consist of a wide variety of unsorted debris; as a result, almost all material must be crushed and screened (19, p. 241).

Two montmorillonitic clay occurrences are found in the western portion of the study area (12, pp. 157-158; 36, p. 32). Both occur in altered tuffs. Ball (12, p. 158) reported that adobe bricks were made from the Sarcabatus Flat deposit (Sec. 31, T 7 S, R 45 E) prior to 1905. Apparently there has been no production from the Pahute Mesa deposit (Sec. 11, T 7 S, R 45 E).

Playa and playa lakes are characteristic land forms in the Basin and Range Province. In Nevada, playa mineral deposits have yielded borax, salt, sodium carbonate and sulfate, and lithium, and they are potential sources of other mineral commodities. Although a recent Nevada Bureau of Mines publication (8) made no specific comment concerning such deposits in the study area, the map accompanying the report indicated that several playas are within the area's boundaries. These playas may have some potential for mineral production. Yes, [unclear]

Several warm water springs and wells are found in the Las Vegas Valley, in the vicinity of Beatty and elsewhere in the study area. In general, the water temperatures are only slightly anomalous and average between 70° and 85° F. The heat source for these warm water occurrences is open to question. Probably they are warmed by an artesian supply from deeply-buried aquifers rather than magmatic sources. Regardless of origin, however, water in the 70° to 85° F range has potential for agricultural and space heating purposes.

RECOMMENDATIONS FOR FURTHER INVESTIGATION

Most of the lands in the study area have been essentially closed to mineral development since the beginning of World War II. Little of its mineral resource potential has been evaluated with respect to current mining techniques and increased commodity prices. Further investigations may determine that deposits once considered as marginal or even submarginal are now economic.

Additional work should be concentrated on those deposits which have produced in the past or are located in favorable geologic environments. The work should be designed to determine probable extensions of known mineralized zones and, if possible, to calculate resulting reserves. The work should include geologic mapping and sampling of all accessible underground workings and surface pits, trenches, and dumps, as well as geochemical and geophysical surveys of mineralized zones. A limited core drilling program should be designed to test any significant anomalies identified by other exploration techniques. A market analysis should also be conducted for all potentially minable deposits.

There are several specific areas within or adjacent to the NBGR that warrant a detailed mineral examination. One prime target lies north and east of Stonewall Mountain, near the western margin of the Cactus Range in western Nye County. This region contains several exposures of intensely hydrothermally-altered and mineralized Tertiary volcanic rocks very similar to those found in the Tonopah and Goldfield districts. At three locations 4/, the altered and mineralized volcanics are overlain by the nonmineralized Thirsty Canyon Tuff. The tuff and surficial alluvium may conceal separate, undiscovered ore bodies, as well as probable extensions of known ore deposits (11, pp. D144-D145). Geophysical surveys, such as electromagnetic (E.M.) and induced-polarization (I.P.), should indicate the existence of a gold-silver anomaly; core drilling would confirm survey results.

4/ The locations are: (1) the area north of Stonewall Mountain, bordering Stonewall Flat; (2) the area between Stonewall Mountain and Mount Helen; and (3) the east side of Stonewall Flat along the western edge of the Cactus Range.

Three other mineralized areas also warrant detailed mineral examinations. They are: (1) The skarn or tactite zones in the Oak Spring mining district; (2) the lead-silver replacements in the Don-Dale mine area near the Bombing Range's eastern boundary in Lincoln County; and (3) the altered and fractured volcanic flows underlying the Fraction Tuff in the Eden, Golden Arrow, and Silverbow mining districts in the Kawich Range along the study area's northern border. Work recommended for these areas includes detailed geologic mapping and sampling of all mine workings and altered zones. Geochemical sampling and geophysical surveys should be conducted to determine the presence of alteration halos or envelopes surrounding buried mineral occurrences.

In addition to the detailed investigation of the four areas described above, reconnaissance sampling and mapping are recommended for the remaining known mineral occurrences. If the reconnaissance discloses the presence of significant anomalies, more detailed studies are recommended.

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APPENDIX A--MINERAL PROPERTY DATA FOR MINES AND PROSPECTS IN THE VICINITY
OF THE NELLIS AIR FORCE BASE AND THE NELLIS BOMBING AND
GUNNERY RANGE, CLARK, LINCOLN, AND NYE COUNTIES, NEVADA

Map No. 1

Mine Name: Antelope View

MILS Sequence No.: 3202300234

Location: Sec. 9, T 4 S, R 47 E

County: Nye

Commodity: Gold, Silver

Production: Kral (4) stated that about \$80,000 is purported to have been produced; the U.S.B.M. has no record of production.

Mining District: Antelope Springs

Geology: The ore occurs in narrow quartz veins in rhyolite. Several veins extend 2,000 feet or more. Vein anastomosing seems common.

At 85-foot depth, the main vein is about 3 feet wide.

Development: The principal working is a 240-foot inclined shaft with 240 feet of laterals on the 60-foot level.

Periods of Activity: The property was located in 1906-1907. Mine development apparently occurred shortly after location.

References: (1, p. 35) 1/ (4, p. 12) (13, pp. 78-79) (17, pp. 87-98)

1/ Underlined numbers in parentheses refer to the list of references at the end of the main report.

Mine Name: Gold Bug group

MILS Sequence No.: 3202300235

Location: Sec. 18, T 4 S, R 47 E

County: Nye

Commodity: Gold

Production: None reported

Mining District: Antelope Springs

Geology: The narrow quartz veins are reported to be in rhyolite.

Development: The property was developed by three shafts and several pits and trenches.

Period of Activity: Unknown

Reference: (4, p. 12)

Mine Name: Jay group

MILS Sequence No.: 3202300236

Location: Sec. 18, T 4 S, R 47 E

County: Nye

Commodity: Silver

Production: None reported

Mining District: Antelope Springs

Geology: Silver ore occurs in narrow quartz veins in rhyolite.

Development: The deposit has been explored by a 100-foot shaft and several smaller ones. The total workings amount to about 600 feet.

Period of Activity: Unknown

Reference: (4, pp. 12-13)

Map No. 2

Mine Name: Arrowhead (Southeastern) mine

MILS Sequence No.: 3201700231

Location: Sec. 33, T 9 S, R 57 E

County: Lincoln

Commodity: Copper, Lead, Silver

Production: None reported

Mining District: Arrowhead(?)

Geology: The mine is in a silicified fault zone near the top of the Pogonip group, and copper-lead-silver(?) minerals crop out along this zone for 100 feet.

Development: A shaft, inclined 60°, follows the mineralized zone to a depth of at least 60 feet.

Period of Activity: The Arrowhead is an old mine, but its history and dates of operation are not known.

Reference: (10, pp. 176-178; Plate No. 1)

Map No. 3

Mine Name: Adolph Neher Adit

MILS Sequence No.: 3202300277

Location: Sec. 35, T 2 S, R 46 E

County: Nye

Commodity: Unknown

Production: None reported

Mining District: Cactus Springs

Geology: Unknown

Development: The workings consist of an adit over 1,000 feet long.

Reportedly, little ore is indicated either inside or on the dump.

Period of Activity: Kral (4) stated that the adit was driven prior to World War II.

Reference: (4, p. 42)

Mine Name: Cactus Nevada Silver mine (Silver Sulphide group) *

MILS Sequence No.: 3202300230

Location: Sec. 3, T 3 S, R 46 E

County: Nye

Commodity: Silver

Production: The mine is reported to have produced a small amount of ore about 1920, but there is no record in U.S.B.M. files.

Mining District: Cactus Springs

Geology: Ore occurs in numerous quartz veins and stringers in rhyolite. Silver is the principal mineral value. Small amounts of gold occurs in some ore.

Development: A 265-foot vertical shaft and about 800 feet of drifts and other workings.

Period of Activity: Kral (4) reported the property was operated by the Cactus Silver Mining Co. in the early 1920's.

References: (1, p. 37) (4, p. 41)

Mine Name: Cactus Range

MILS Sequence No.: 3202300657

Location: Sec. 6, T 3 S, R 46 E

County: Nye

Commodity: Gemstones (Turquoise)

Production: Morrissey (6) stated that previous production has amounted to about \$25,000.

Mining District: Cactus Springs

Geology: Turquoise occurs as nodules and veinlets in altered quartz monzonite.

Development: Unknown

Period of Activity: Unknown

Reference: (6, p. 28)

Mine Name: Urania mine

MILS Sequence No.: 3202300633

Location: Sec. 10, T 3 S, R 46 E

County: Nye

Commodity: Gold, Silver

Production: None reported

Mining District: Cactus Springs

Geology: Unknown, probably similar to the Cactus Nevada Silver mine.

Development: Workings include several adits, trenches, and pits.

Period of Activity: Unknown

Reference: (18)

Map No. 4

Mine Name: Apex Limestone Quarry (U.S. Lime Products Division of the Flintkote Co.)

MILS Sequence No.: 3200300061

Location: NW1/4 Sec. 26, T 18 S, R 63 E

County: Clark

Commodity: Limestone

Production: The Nevada Bureau of Mines and Geology reported that production from the quarry averages over 500,000 tons annually. This generally agrees with U.S.B.M. records for 1971-1975.

Mining District: Dike(?)

Geology: The quarry lies in a group of low hills composed of limestone and dolomite of Devonian and Missippian Age. Production comes from upper member of the Sultan Limestone (Devonian).

The limestone contains less than 2 percent combined SiO₂, Fe₂O₃, and MgCO₃.

Development: The operation includes a crushing and calcining plant in addition to the quarry.

Period of Activity: The property is currently active.

References: (5, p. 205) (15, p. 164) (36, p. 10) (37, p. 5)
(38, p. 4)

Mine Name: Lead King mine

MILS Sequence No.: 32000300065

Location: SE1/4 Sec. 6, T 19 S, R 63 E

County: Clark

Commodity: Lead

Production: Two carloads of ore averaging 59 percent lead have been reportedly shipped. There is no record of production in U.S.B.M. files.

Mining District: Dike

Geology: Ore consists of galena and cerussite in a 1- to 4-foot-wide shear zone in carboniferous limestone. The shear zone is cut off at the bottom of the shaft by a nearly horizontal bedding plane [thrust(?)] fault.

Development: The workings consist of a 242-foot shaft with laterals at the 26-, 135-, and 242-foot levels.

Period of Activity: The claims were originally located about 1916 and worked intermittently. Most mine workings were opened in the late 1920's and early 1930's.

References: (5, pp. 144, 180) (30)

Map No. 5

Mine Name: Andies mine

MILS Sequence No.: 3201700063

Location: Sec. 36, T 4 S, R 55 E

County: Lincoln

Commodity: Mercury

Production: Two flasks were produced in 1955.

Mining District: Don Dale

Geology: Rocks exposed near the claims are chiefly Tertiary andesite and rhyolite flows underlain by limestone. Ore consists of disseminated crystals of cinnabar localized in fractured and altered volcanic rocks.

Development: The workings include a 31-foot vertical shaft, 140-foot inclined adit, over 5,200 feet of drill holes, and numerous pits and trenches.

Period of Activity: Mercury was discovered in 1919 and the claims were located in 1955; exploration and development work was done in 1955 and 1956.

References: (10, Plate 1) (27)

Mine Name: Don-Dale mine

MILS Sequence No.: 3201700217

Location: Sec. 12, T 5 S, R 55 E

County: Lincoln

Commodity: Lead, Silver, Copper, Zinc

Production: None reported

Mining District: Don-Dale

Geology: Ore occurs in fissure and replacement deposits in lime-shale along a major fault zone. It is highly silicious and is comprised largely of oxides with occasional small flecks of galena.

Development: The workings include a 90-foot adit with a 45-foot winze, a 40-foot shaft, and a 25-foot open cut.

Period of Activity: The property was explored during and after World War II.

References: (10, p. 174, Plate 1) (22)

Mine Name: Jackson mine (Sun Rise No. 4)

MILS Sequence No.: 3201700050

Location: Sec. 24, T 5 S, R 55 E

County: Lincoln

Commodity: Lead, Silver, Zinc, Copper

Production: About 10 tons of \$50 ore were shipped in 1942.

Mining District: Don-Dale

Geology: Ore occurs in a small fissure along fractures between lime-shale and quartzite.

Development: The workings include three small shafts and several small surface cuts.

Period of Activity: The property was explored prior to and during World War II.

Reference: (21)

Map No. 6

Mine Name: Golden Crown group (Eden mine)

MILS Sequence No.: 3202300294

Location: Sec. 5, T 1 N, R 50 E

County: Nye

Commodity: Silver

Production: None reported

Mining District: Eden (Eden Creek, Gold Belt)

Geology: The country rock is rhyolite which has been intruded by porphyritic andesite. Dump material consists of rock with quartz seams containing pyrite.

Development: The workings consist of a 1,700-foot and a 500-foot adit.

Period of Activity: The deposit was discovered in 1906; most of the work was done in 1923 and 1924. There has been little activity since.

References: (1, p. 37) (4, p. 54)

Mine Name: Nevada Triumph group

MILS Sequence No.: 3202300291

Location: Sec. 6, T 1 N, R 50 E

County: Nye

Commodity: Gold, Silver

Production: None reported

Mining District: Eden (Eden Creek, Gold Belt)

Geology: Gold occurs in iron-stained silicified shear zone in rhyolite. Values vary considerably but are usually low. Kral (4) states the property may have potential for the development of a large low-grade deposit.

Development: The workings include several shallow shafts and cuts and trenches, in addition to two adits with about 300 feet of laterals.

Period of Activity: The claims were located in 1926 and were actively explored into the early 1930's.

References: (1, p. 37) (4, p. 53)

Mine Name: Oro Cache Mining and Milling Company

MILS Sequence No.: 3202300293

Location: Sec. 3, T 1 N, R 49 E

County: Nye

Commodity: Gold

Production: None reported

Mining District: Eden (Eden Creek, Gold Belt)

Geology: Free milling gold is reported to occur in vein and shear zones in rhyolite. Assays are reported to range between \$2 and \$250 per ton with a large percentage between \$10 and \$70 [\$20.67(?) per ounce Au].

Development: The workings include a shallow shaft (50 feet) with drifts on two levels plus a 218-foot adit with drifts.

Period of Activity: The claims were explored between 1929 and 1934.

References: (1, p. 37) (4, p. 54)

Mine Name: South Gold Mining Company

MILS Sequence No.: 3202300292

Location: Sec. 20, T 1 N, R 50 E

County: Nye

Commodity: Silver

Production: About \$5,000, part from placers, has been reported.

U.S.B.M. records indicate that 17 ounces gold and 66 ounces silver were mined from underground working between 1935 and 1942.

Mining District: Eden (Eden Creek, Gold Belt)

Geology: Gold occurs, with little or no silver, in veins and shear zones in rhyolite. Overburden is reported to carry gold values. Assays ranged between \$3 and \$5 per ton (\$35 per ounce gold).

Development: Workings include a 1,000-foot adit caved at the portal, a 500-foot adit, and a 300-foot adit. A 35 ton-per-day mill was built about 1938.

Period of Activity: The property was worked between 1930 and World War II.

References: (1, p. 37) (4, pp. 53-54)

Map No. 7

Mine Name: Black Top and Red group (Red Placer claim)

MILS Sequence No.: 3202300175

Location: N1/2 Sec. 2, R 10 S, T 47 E

County: Nye

Commodity: Fluorspar

Production: None reported

Mining District: Fluorine (Beatty, Bare Mountain, Carrara, Big Dunes, Lee Telluride)

Geology: A mineralized felsite flow reportedly contains a few percent of fluorite.

Development: The workings include several pits and (10- to 15-foot) adits.

Period of Activity: The claims were staked in 1940; the area was probably prospected for gold-silver at an earlier date.

Reference: (26)

Mine Name: Paramount Placer property

MILS Sequence No.: 3202300311

Location: Sec. 9, T 11 S, R 49 E

County: Nye

Commodity: Gold(?)

Production: No appreciable production; no record in U.S.B.M. files.

Mining District: Fluorine (Beatty, Bare Mountain, Carrara, Big
Dunes, Lee, Telluride)

Geology: Partly cemented gravels

Development: There has been some drifting on higher grade material.

Period of Activity: Unknown

Reference: (4, p. 68)

Map No. 8

Mine Name: Las Vegas Pit and Apex Plant - Pabco Corp. [Schumaker
(Apex) Gypsum mine]

MILS Sequence No.: 3200300066 and 3200300067

Location: Sec. 5, T 20 S, R 64 E

County: Clark

Commodity: Gypsum

Production: The Nevada Bureau of Mines estimates the production at over 100,000 tons annually.

Mining District: Frenchman Mountain(?)

Geology: The ore occurs as a gypsum-silt-clay caprock deposit of Pliocene or younger age. The deposit is immense, with reserves in the hundreds of millions of tons.

Development: The property's facilities include the quarry, washing plant, and gypsum wallboard plant.

Period of Activity: The washing plant was built in 1959 and the wallboard plant in 1964. Pabco Corp. took over operation of the properties in February 1977.

References: (5, pp. 154, 204) (7, p. 26) (36, p. 10) (37, p. 5)
(38, p. 4)

Mine Name: Dasida, Stevens, Sproul, Bracken group

MILS Sequence No.: 3200300312

Location: Sec. 21, T 20 S, R 63 E

County: Clark

Commodity: Gypsum

Production: None reported

Mining District: Frenchman Mountain

Geology: Massive gypsum occurs in beds up to 300 feet thick, with a limestone footwall and hanging wall. The gypsum and limestone may be in either the Kaibab or Moenkopi Formations.

Development: Unknown

Period of Activity: The deposits have been recognized for many years, but it is not known when they were discovered. The U.S. Bureau of Mines examined the properties in 1945.

Reference: (31)

Mine Name: Gypsum Cave

MILS Sequence No.: 3200300067

Location: Sec. 11, T 20 S, R 63 E

County: Clark

Commodity: Gypsum

Production: None reported

Mining District: Frenchman Mountain(?)

Geology: Gypsum occurs as lenses in the Muddy Creek Formation (Tertiary).

Development: Unknown

Period of Activity: Unknown

References: (5, p. 204) (36, p. 10)

Mine Name: Sunrise Mountain

MILS Sequence No.: 3200300424

Location: W1/2 Sec. 1, T 20 S, R 62 E

County: Clark

Commodity: Gypsum

Production: None reported

Mining District: Frenchman Mountain(?)

Geology: Gypsum is exposed in rock outcrops.

Development: Unknown

Period of Activity: Unknown

Reference: (36, p. 9)

Mine Name: White Eagle

MILS Sequence No.: 3200300070

Location: Secs. 8 and 17, T 21 S, R 63 E

County: Clark

Commodity: Gypsum

Production: The Nevada Bureau of Mines estimated that the production was 100,000 tons annually prior to 1960.

Mining District: Frenchman Mountain(?)

Geology: Gypsum occurs in 15-foot-thick beds in the Moenkopi Formation.

Development: Open pit mine

Periods of Activity: The mining began around 1938 and continued to 1956.

Reference: (5, p. 204)

Mine Name: Unnamed gypsum deposit

MILS Sequence No.: 3200300357

Location: Sec. 14, T 20 S, R 62 E

County: Clark

Commodity: Gypsum

Production: None reported

Mining District: Frenchman Mountain(?)

Geology: Gypsic material is reported to be 100 to 125 feet thick and cropping out for nearly a mile.

Development: Unknown

Period of Activity: Unknown

Reference: (5, p. 204)

Mine Name: Unnamed gypsum deposit

MILS Sequence No.: 3200300358

Location: E1/2 E1/2 Sec. 1, T 20 S, R 62 E

County: Clark

Commodity: Gypsum

Production: None reported

Mining District: Frenchman Mountain(?)

Geology: Several hundred acres are underlain by up to 15-foot-thick beds of gypsite.

Development: Unknown

Period of Activity: Unknown

Reference: (5, p. 204)

Map No. 9

Mine Name: June Bug mine

MILS Sequence No.: 3200300063

Location: SE1/4 Sec. 20, T 18 S, R 61 E

County: Clark

Commodity: Zinc, Silver, Lead, Gold

Production: Longwell (5) reports that 1,000 tons were shipped from the district in 1916 and 1917. Most ore was from the June Bug property. The shipment yielded 9.25 ounces gold, 2,418 ounces silver, 16,707 pounds lead, and 620,650 pounds zinc. U.S.B.M. production records generally agree with these figures.

Mining District: Gass Peak

Geology: Oxidized zinc ore is found as replacements along shear zones in dolomitized Paleozoic limestone.

Development: Unknown

Period of Activity: The property was operated in 1916 and 1917.

References: (5, pp. 145, 182) (15, p. 55)

Mine Name: Marble Quarry

MILS Sequence No.: 3200300064

Location: SW1/4 Sec. 24, T 18 S, R 61 E

County: Clark

Commodity: Building stone(?)

Production: None reported

Mining District: Gass Peak

Geology: Very fine-grained marble in limestone of Carboniferous Age.

Development: Unknown

Period of Activity: Unknown

Reference: (5, p. 205)

Mine Name: Sampson claims

MILS Sequence No.: 3200300062

Location: NW1/4 Sec. 24, T 18 S, R 61 E

County: Clark

Commodity: Zinc, Copper, Gold, Silver

Production: None reported

Mining District: Gass Peak

Geology: Hydrozincite and calamine occur along fractures in brecciated zones in dolomitized Monte Cristo Limestone. Malachite, chrysocolla, gold, and silver are also present. In addition, a select sample contained 0.068 percent U_3O_8 .

Development: Principal workings include a 15-foot vertical shaft and a 75-foot inclined shaft having several drifts and winzes.

Period of Activity: Unknown

References: (2, p. 36) (5, pp. 145, 182)

Map No. 10

Mine Name: Pius Kaelin group

MILS Sequence No.: 3202300312

Location: Sec. 34, T 4 S, R 45 E

County: Nye

Commodity: Lead, Gold, Silver

Production: Small, unknown amount; no record in U.S.B.M. files.

Mining District: Gold Crater

Geology: Galena and cerussite occur in brecciated, pipe-like zones.

Mining ore reportedly contained 10 percent lead, 14 to 24 ounces silver and \$8 to \$12 gold (\$35/ton) per ton. Possibly mineralized altered rocks extend beneath the Thirsty Canyon Tuff adjacent to the mining area (13).

Development: The workings reportedly consist of a 20-foot inclined shaft and a 30-foot shaft with minor laterals.

Period of Activity: Apparently the property was operated after World War II.

Other: Mine run ore was apparently shipped to a small two-stamp and gravity mill at Stonewall Spring, 24 miles by road, west of the mine.

References: (4, pp. 69-70) (13, p. 79)

Mine Name: Clifford gold-silver prospect (Jeep group)

MILS Sequence No.: 3202300172

Location: Sec. 12, T 1 N, R 48 E(?)

County: Nye

Commodity: Silver, Gold

Production: Kral (4) estimated that about 200 tons of ore valued between \$18 and \$70 per ton were shipped prior to 1951.

Mining District: Golden Arrow (Blakes Camp)

Geology: The Clifford vein is in a 3- to 4-foot-wide, crushed fault zone in silicified rhyolite. The ore occurs in quartz stringers and extends 12 to 18 inches into the silicified footwall. The ore mineral is primarily cerargyrite, but disseminated flecks of argentite and finely-divided native gold are also found.

Two parallel veins have been exposed within 300 feet of the main vein; a cross vein is about 600 feet west of the 1947 workings.

Development: Early workings (about 1920) include several shallow trenches and cuts, plus a 60-foot shaft. Later workings (1947) consisted of three inclined shafts varying in depth from 10 to 15 feet. Kral (4) reported that one shaft had been sunk to a 100-foot depth.

Period of Activity: The claims were originally located in 1920 and abandoned a short time later. They were relocated in late 1946. The property was active in the early 1950's.

Other: Benson (23) described the deposit as "...probably the most important discovery made in recent years in Nevada."

References: (1, p. 37) (4, p. 72) (24)

Mine Name: Gold Bar group

MILS Sequence No.: 3202300313

Location: Sec. 2, T 1 N, R 48 E

County: Nye

Commodity: Silver, Gold

Production: Ferguson (14) reported almost no production prior to 1915. Kral (4) states the Gold Bar produced 73 tons valued at \$4,246 in 1941 and 1946. Production during the early 1940's may have been included with the Golden Arrow.

Mining District: Golden Arrow (Blakes Camp)

Geology: The vein consists of a series of closely-spaced, parallel veinlets with pyrite, and in some places, small amounts of finely-divided gold with the composition of electrum. Ferguson (14) reported that the ore averaged about \$25 a ton (\$20.67 per ounce gold) and could be up-graded by hand sorting to about \$100 per ton.

Development: In 1916, the property was developed by a 500-foot inclined shaft that was accessible for 140 feet.

Period of Activity: Most workings were probably completed prior to 1915. Kral (4) states that both the Gold Bar and Golden Arrow were operated by lessees in the early 1940's.

References: (1, p. 37) (4, pp. 71-72) (14, p. 120)

Mine Name: Golden Arrow (Page) group

MILS Sequence No.: 3202300314

Location: Sec. 11, T 1 N, R 48 E

County: Nye

Commodity: Silver, Gold

Production: Ferguson (14) reported almost no production prior to 1915; U.S.B.M. production records indicate an output of 744 tons of ore, yielding 193 ounces gold and 12,139 ounces silver in 1940 and 1941.

Mining District: Golden Arrow (Blakes Camp)

Geology: The shaft of the Golden Arrow mine appears to follow the Page fault. Both andesite and rhyolite are found on the mine dump, but the ore seems to lie in the rhyolite only. The ore consists of small quartz-filled fissures carrying specks of sulfides. The wallrock is silicified but not sericitized.

Development: The working consists of a shaft of unknown depth.

Period of Activity: Most work done on the mine was completed prior to 1915. Kral (4) states that lessees shipped ore from the Golden Arrow and Gold Bar groups in the early 1940's.

References: (1, p. 37) (4, pp. 71-72) (14, pp. 119-120)

Map No. 12

Mine Name: Free Gold and Extension group

MILS Sequence No.: 3202300315

Location: Sec. 1, T 3 S, R 44 E

County: Nye

Commodity: Gold

Production: Kral (4) reported only minor shipments from property.

No production records in U.S.B.M. files.

Mining District: Goldfield (Quartz Mountain)

Geology: Gold occurs in highly-oxidized shear zones in dacite.

Samples reportedly contained up to one-half ounce gold per ton.

Development: Principal workings consist of an adit with about 1,800 feet of workings and several smaller adits and shafts totalling 500 feet.

Period of Activity: Unknown

Reference: (4, pp. 72-73)

Map No. 13

Mine Name: Black Metal (Lane, Black Medal)

MILS Sequence No.: 3201700225

Location: Sec. 14, T 7 S, R 55 E

County: Lincoln

Commodity: Lead, Zinc

Production: None has been recorded, but some ore has undoubtedly been mined.

Mining District: Groom

Geology: Most of the Black Metal claim is covered by alluvium; however, the inclined shaft is in a dark-gray limestone, similar to the limestone found at the Groom mine. The ore carries much more zinc than is found in the Groom mine; however, its distribution is erratic: above the 110-foot level a sample from a stope assayed 6.3 percent zinc, while a sample from a shallow winze a short distance away assayed 22.2 percent zinc.

Development: The prospect has been developed by a 110-foot inclined shaft with a short drift on the 100-foot level. There has been some stoping above the drift and north of the shaft.

Period of Activity: The Lane claims were originally located in 1917.

References: (3, p. 45) (10, p. 149, Plate 1)

Mine Name: Golden Star mine

MILS Sequence No.: 3201700002

Location: Sec. 11, T 6 S, R 55 E

County: Lincoln

Commodity: Lead, Silver, Gold(?)

Production: None reported

Mining District: Groom(?)

Geology: Unknown

Development: As of 1942, the property was developed by numerous cuts and trenches and a 300-foot-long crosscut.

Period of Activity: Original claims were located in 1907. The claims were reloacted in 1931 and 1934.

Reference: (32)

Mine Name: Groom

MILS Sequence No.: 3201700224

Location: Sec. 14, T 7 S, R 55 E

County: Lincoln

Commodity: Lead, Silver, Copper, Zinc

Production: U.S.B.M. production records show that except for seven years, the Groom mine produced continuously from 1915 to 1956. The value of ore in 1977 prices exceeds \$3.75 million.

Mining District: Groom

Geology: The mine is in a 2,000-foot-wide, complexly faulted grabben. Productive ore bodies are bedded and irregular replacement bodies in limestone. The primary ore mineral is argentiferous galena with subordinate sphalerite; the small amount of copper occurs as chalcopyrite or tetrahedrite. A little pyrite is present, but the amount of gold is nil.

Development: The Groom mine is developed by a 210-foot shaft, two adits, and extensive underground workings.

Period of Activity: The claims were located in 1864. In 1872, an unsuccessful attempt was made to develop the property. The mine remained essentially idle until 1915 when lessees began production. Except for seven years, the mine operated continuously until 1956.

References: (3, p. 35-45) (10, p. 148, Plate 1) (20)

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Mine Name: Hanus

MILS Sequence No.: 3201700221

Location: Sec. 33, T 6 S, R 55 E

County: Lincoln

Commodity: Gold

Production: None reported

Mining District: Groom

Geology: The prospect is in a west-dipping gold-bearing quartzite breccia zone. A sample of dump material assayed 1.08 ounces gold per ton.

Development: The workings consist of a 60-foot inclined shaft in the fracture zone.

Period of Activity: Prior to 1945

References: (3, p. 47) (10, Plate 1)

Mine Name: Unnamed limestone

MILS Sequence No.: 3201700098

Location: Sec. 10, T 7 S, R 55 E

County: Lincoln

Commodity: Limestone (Dimension stone)

Production: Small but unknown amount quarried local ornamental building and aquarium stone.

Mining District: Groom(?)

Geology: Platy Upper Cambrian limestone

Development: Unknown

Period of Activity: Unknown

Reference: (10, p. 125)

Map No. 14

Mine Name: Black Hawk Mercury mine

MILS Sequence No.: 3202300125

Location: Sec. 13, T 2 S, R 53 E

County: Nye

Commodity: Mercury

Production: In 1951, Kral (4) reported that 68 flasks of mercury have been produced since 1929.

Mining District: Kawich (Gold Reed, Queen City)

Geology: The deposit is in a silty limestone in fault contact with a quartzite sandstone. The ore occurs as cinnabar in botryoidal masses with associated quartz veins.

Development: The workings consist of a 100-foot vertical shaft adit on two levels and two exploration pits (1).

Period of Activity: The property was discovered in 1929. There has been no activity since the early 1940's.

References: (1, p. 39) (4, p. 92) (29)

Mine Name: Gold Reed mine

MILS Sequence No.: 3202300342

Location: Sec. 33, T 4 S, R 51 E

County: Nye

Commodity: Gold

Production: Kral (4) reported that a shipment of high-grade ore was made; U.S.B.M. records indicate that 13 tons of ore yielding 2 ounces gold and 2 ounces silver were mined in 1941.

Mining District: Kawich (Gold Reed, Queen City)

Geology: Ore containing free gold occurs in a silicified monzonite porphyry. Most of the better grade ore came from near the surface; pyrite was encountered at about 150 feet in deeper workings.

Development: The main working is a 300-foot shaft; shallow workings are found south of the shaft.

Period of Activity: Apparently the mine was active prior to World War II and may also have been between the war and 1950.

Reference: (4, p. 92)

Mine Name: Mercury group

MILS Sequence No.: 3202300344

Location: Sec. 27, T 2 S, R 53 E

County: Nye

Commodity: Mercury

Production: None reported

Mining District: Kawich (Gold Reed, Queen City)

Geology: Cinnabar occurs as nuggets and as a coating of limestone and quartzite gravel in crevices in a limestone cave.

Development: Unknown

Period of Activity: Unknown

Reference: (4, p. 92)

Mine Name: Oswald claims

MILS Sequence No.: 3202300343

Location: Sec. 11, T 4 S, R 52 E

County: Nye

Commodity: Mercury

Production: Kral (4) reported 14 pounds of mercury was recovered from 1,400 pounds of cinnabar ore during a test run. No record of the property is found in U.S.B.M. files.

Mining District: Kawich (Gold Reed, Queen City)

Geology: Occurrences of argentiferous galena, smithsonite, and cinnabar are found in narrow veins and lenses in quartzite intruded by andesite dikes.

Development: Workings consist of a 200-foot adit, several shallow shafts, and some trenching.

Period of Activity: The property was located in 1938.

Reference: (4, p. 92)

Mine Name: Queen City claims

MILS Sequence No.: 3202300233

Location: Sec. 16, T 2 S, R 53 E

County: Nye

Commodity: Manganese

Production: None reported

Mining District: Kawich (Gold Reed, Queen City)

Geology: Several veins, up to 100 feet long and 40 feet wide, of gibbsite and manganese occur as replacements in hydrothermally altered limestone. The manganese minerals are mixtures of pyrolusite and lithiophorite.

Development: The deposit has been explored by several trenches and pits.

Period of Activity: The claims were located in 1935; it is not known when the property was last active.

Reference: (1, p. 40)

Mine Name: Unnamed mercury deposit

MILS Sequence No.: 3202300676

Location: Sec. 19, T 2 S, R 54 E

County: Nye

Commodity: Mercury

Production: None reported

Mining District: Kawich (Gold Reed, Queen City)

Geology: Cinnabar occurs in shears in highly altered andesite.

Development: The workings include a 45-foot shaft with 160 feet of drifting on the 22-foot and bottom levels, plus a few large surface cuts and trenches.

Period of Activity: Unknown

Other: This deposit was described by Kral (4, p. 92) as the Black Hawk mercury mine, but Cornwall (1, p. 39) states that the Black Hawk is about 2 miles northwest of this property.

References: (1, p. 39) (4, p. 92)

Map No. 15

Mine Name: Mellan Gold mines group

MILS Sequence No.: 3202300399

Location: Sec. 3, T 3 S, R 48 E

County: Nye

Commodity: Gold

Production: Kral (4) estimated production at about \$1,000 prior to World War II. U.S.B.M. records indicate that 33 tons of ore yielding 11 ounces gold and 50 ounces silver were mined in 1936 and 1937.

Mining District: Mellan Mountain

Geology: The gold-silver ore occurs in shear zones in rhyolite and shale. Ore zones are reported to be 4 to 6 feet wide. Four samples, containing primarily gold values, ranged between \$17 and \$27 per ton.

Development: The workings include a 400-foot inclined shaft with levels at 40, 80, 160, and 400 feet with laterals totalling about 700 feet; a 100-foot shaft with a 40-foot drift on the 50-foot level; 600 feet of workings on the 100-foot level; and a 100-foot adit.

Period of Activity: The property was located in 1930 and was operated prior to World War II.

References: (1, pp. 38-39) (4, pp. 131-132)

Map No. 16

Mine Name: Mine Mountain

MILS Sequence No.: 3202300232

Location: T 11 S, R 52 E

County: Nye

Commodity: Lead, Merucry, Silver

Production: None reported

Mining District: Mine Mountain

Geology: All workings are in high-angle, normal faults, in brecciated quartzite and silcified dolomite. According to Cornwall (1, p. 39), one sample contains 10 percent lead, 0.5 percent mercury, and 0.07 percent silver.

Development: Workings include four adits and two shallow shafts.

Period of Activity: Claim notices indicate that the property was located in 1928.

Reference: (1, p. 39)

Map No. 17

Mine Name: Climax (Tamney)

MILS Sequence No.: 3202300009

Location: S1/2 Sec. 18, T 8 S, R 53 E

County: Nye

Commodity: Tungsten

Production: Some ore was reportedly shipped in 1917.

Mining District: Oak Spring

Geology: Ore occurs in several parallel tactite beds interbedded with marbleized limestone. It is concentrated in layers mostly along the hanging walls. The ore mineral is scheelite in a gangue of dark brown to black garnet, calcite, epidote, feldspar, and quartz.

Development: The property is developed by 882 feet of drifts in the Goldfield adit and 625 feet of drifts, 91 feet of raises, and 69 feet of stopes in the Carlisle adit. The two adits are not connected.

Other: As of September 1958, total indicated and inferred resources were 42,750 tons averaging 0.675 percent W03.

Period of Activity: Initial mining activity began in 1905 when gold, silver, copper, and turquoise were discovered. Tungsten was discovered in 1937; Defence Minerals Exploration Administration (DMEA) exploration of the project occurred from 1956 to 1957.

References: (1, p. 39) (4, p. 139) (19, p. 156) (28)

Mine Name: Garnetyte lode

MILS Sequence No.: 3202300015

Location: SE1/4 SW1/4 Sec. 18, T 8 S, R 53 E

County: Nye

Commodity: Tungsten

Production: Kral (4) reported that about 2,500 tons of ore valued at \$4,000 was mined and concentrated in 1940.

Mining District: Oak Spring

Geology: The ore occurs in a garnetite bed.

Development: Principal working is a large, open cut.

Period of Activity: The principal work was done during 1940; the mill was removed shortly before World War II.

References: (1, p. 39) (4, pp. 138-140)

Mine Name: Indian Trail group

MILS Sequence No.: 3202300017

Location: Sec. 18, T 8 S, R 53 E

County: Nye

Commodity: Tungsten

Production: Kral (4) reported 110 tons of ore containing 0.94 percent WO_3 was mined in 1940. Recovered concentrates were valued at \$1,150.

Mining District: Oak Spring

Geology: Unknown; presumably similar to the Crystal claims.

Development: Workings include a shallow inclined shaft which has been developed into an open pit.

Period of Activity: It is unknown when the claims were first located; apparently mining ceased after 1940.

Reference: (4, p. 140)

Mine Name: Michigan Boy group

MILS Sequence No.: 3202300406

Location: Sec. 22, T 9 S, R 53 E

County: Nye

Commodity: Silver, Lead

Production: None recorded

Mining District: Oak Spring

Geology: Partly oxidized argentiferous galena occurs in a vein in flat-lying calcareous shale. The 8- to 24-inch vein can be traced for several hundred feet. Ore on dumps assayed 11 to 16 ounces silver per ton and 1.5 percent lead.

Development: The workings consist of a 50-foot inclined shaft, several shallow pits and trenches.

Period of Activity: Unknown

References: (1, p. 39) (4, pp. 140-141)

Mine Name: Oak Springs Tungsten prospect

MILS Sequence No.: 3202300132

Location: Sec. 2, T 8 S, R 53 E

County: Nye

Commodity: Tungsten

Production: Between 5,000 to 6,000 tons were reportedly mined in 1941; about 80 pounds of scheelite were produced.

Mining District: Oak Spring

Geology: Scheelite accompanied by powellite occurs associated with a quartz vein in limestone. In places the mineralized zone extends out into the limestone, forming small irregular pods. Sample material assayed 0.22 percent W03. Estimated reserves published in 1957 were: 35,000 tons of probable and possible ore at 0.5 percent or higher W03 and 6,000 tons of possible "marginal and submarginal" ore at 0.1 to 0.49 percent W03 (15, p. 381).

Development: Workings include a 1,000-foot adit, trenches, and test pits along a vein for about 200 feet.

Period of Activity: Seventeen claims were located in 1937. All activity apparently ended around 1941.

References: (16, pp. 380-381) (25)

Mine Name: Old Glory patented claim

MILS Sequence No.: 3202300408

Location: Sec. 15, T 9 S, R 52 E

County: Nye

Commodity: Silver

Production: None reported

Mining District: Oak Spring

Geology: Workings were driven on shears in a highly-altered calcareous shale.

Development: Workings consist of a caved adit and a shallow shaft.

Period of Activity: The claim was patented in 1927, and Kral states that apparently that was the last time work was done on the property.

Reference: (4, p. 141)

Mine Name: Rainstorm group

MILS Sequence No.: 3202300407

Location: Sec. 15, T 11 S, R 53 E

County: Nye

Commodity: Lead, Silver, Gold

Production: Kral reported (4) that 80 tons containing 55 percent lead, plus 25 ounces silver and 0.25 ounces gold, were shipped prior to World War II. No production is recorded in U.S.B.M. files.

Mining District: Oak Spring

Geology: Not much is known about the geology. Samples of vein material assayed 31.5 percent lead, plus 0.07 ounces gold and 11.6 ounces silver per ton.

Development: Workings consist of a 220-foot shaft and a 150-foot adit, and several shallow shafts and cuts.

Period of Activity: Prior to World War II.

References: (1, p. 39) (4, p. 141)

Mine Name: "Bone" Magnesite deposit

MILS Sequence No.: 3202300409

Location: Sec. 10, T 9 S, R 53 E

County: Nye

Commodity: Magnesite

Production: None reported

Mining District: Oak Spring

Geology: Magnesite is reported in limestone near beds of chert.

Sorted ore assayed 43.6 percent MgO, 2.1 percent SiO₂, and 3.4 percent CaO.

Development: None reported

Period of Activity: Unknown

Reference: (4, p. 141)

Map No. 18

Mine Name: Kelly (Blue Bell)

MILS Sequence No.: 3201700230

Location: Sec. 21, T 9 S, R 55 E

County: Lincoln

Commodity: Silver, Gold, Lead

Production: U.S.B.M. records indicate the mine produced 183 tons of ore yielding 2 ounces gold, 1,082 ounces silver, 423 pounds copper, and 118,649 pounds lead prior to 1938.

Mining District: Papoose

Geology: The ore occurs in quartzite along breccia zones or narrow fissures.

Development: Unknown

Period of Activity: Apparently the property was active during the 1930's; however, no other information is available.

Reference: (10, p. 176, Plate 1)

Map No. 19

Mine Name: Blue Horse mine

MILS Sequence No.: 3202300425

Location: Sec. 35, T 1 N, R 49 E

County: Nye

Commodity: Silver, Gold

Production: Bureau of Mines records indicate that the mine produced a total of 529.17 ounces gold and 5,825 ounces of silver in 1920, 1923, and 1934.

Mining District: Silverbow

Geology: Ore occurs in a northwest-bearing vein averaging 2 to 4 feet wide near a silicified rhyolite ridge. Ore minerals probably include ruby silver (proustite and/or pyrargyrite), cerargyrite, stephanite, and free gold.

Development: In 1951, the property's workings included a 100-foot shaft, several cuts, and a 300-foot adit which was caved at the portal. In 1929, the mine was equipped with a 50 ton-per-day flotation mill. The mill has since been removed.

Period of Activity: The mine was active in the 1920's and 1930's; however, it is not known when the property was discovered. Ekren (13, p. 80) reported that the Tickabo Mining and Milling Co. was reopening mines in the Silverbow district in 1964; it is not known to which property he was referring.

References: (4, p. 163) (13, p. 80)

Mine Name: Catlin group

MILS Sequence No.: 3202300427

Location: Sec. 35, T 1 N, R 49 E

County: Nye

Commodity: Silver, Gold

Production: Kral (4) reported that shipments were made as early as 1906; however, the amount is unknown. About 241 tons valued at \$3,672 was reportedly shipped in 1941. Much of this material is believed to have come from the mine dumps. U.S.B.M. indicates the property produced a total of 552 tons yielding 74 ounces gold and 20,050 ounces silver from 1907 to 1944.

Mining District: Silverbow

Geology: Ore occurs in a quartz vein 2 to 8 feet wide in rhyolite country rock. Silver chloride (cerargyrite) is the main ore mineral near the surface, and silver sulfide at depth.

Development: The workings include several adits and short shafts and some drifts and stopes on the vein.

Period of Activity: This is one of the older mines in the district. It was operated prior to 1906. There was some underground activity from 1941 to 1944. Ekren (13) reported that some properties in the district were being reopened in 1964; it is not known which properties were involved.

References: (4, p. 164) (13, p. 80)

Mine Name: Hillside mine

MILS Sequence No.: 3202300428

Location: Sec. 36, T 1 N, R 49 E

County: Nye

Commodity: Silver, Gold

Production: Kral (4) recorded that some shipments from the property were made in 1941. They reportedly amounted to 285 tons yielding \$7,307. U.S.B.M. records show that 746 tons yielding 97 ounces of gold and 13,251 ounces of silver were mined from 1940 to 1942.

Mining District: Silverbow

Geology: The mineral occurrence is reported to be similar to that found at Catlin group.

Development: In 1951, the workings included an adit with 700 feet of laterals and 500 feet of raises and winzes with sublaterals. Other workings included a 300-foot adit with 100 feet of laterals and several shallow shafts.

Period of Activity: It is not known when the property was discovered. It was active from 1940 to 1942. Ekren (13) reported that in 1964 a company was reopening some workings in the district, but it is not known which properties were involved.

References: (4, pp. 164-165) (13, p. 80)

Mine Name: Silver Glance group

MILS Sequence No.: 3202300426

Location: Sec. 35, T 1 N, R 49 E

County: Nye

Commodity: Silver, Gold

Production: Kral (4) reported that small shipments were made prior to 1928 and that lessees shipped 160 tons of ore averaging 35 ounces silver and 0.05 ounces gold per ton between 1940 and 1942. U.S.B.M. records show it produced 265 tons from 1908 to 1910 and 128 tons in 1941 and 1942. Total output for the two periods was 47.05 ounces gold and 12,390 ounces of silver.

Mining District: Silverbow

Geology: The country rock is rhyolite; the ore is quartzose and contains pyrite. The ore minerals are probably similar to those found at the Blue Horse mine.

Development: In 1951, the working included several short adits with the lower one having track and ore cars. A blacksmith shop was located near the lower portal.

Period of Activity: The property is believed to be the oldest in the district, having been located in 1900 or 1901. Most workings were developed prior to 1928. The property was active in 1941 and 1942. This property may be one of those mines reopened by the Tickabo Mining and Milling Co. in 1964.

References: (4, pp. 163-164) (13, p. 80)

Map No. 20

Mine Name: Sterlog group

MILS Sequence No.: 3202300429

Location: Sec. 4, T 5 S, R 44 E

Commodity: Silver

Production: None reported

Mining District: Stonewall

Geology: Little is know of the deposit's geology other than the vein contained some silver minerals.

Development: Workings include a 240-foot shaft and a mile-long adit.

Period of Activity: The Stonewall district was first prospected in 1905, and apparently small shipments were made in 1911 and 1915. The long adit on the Sterlog claims was driven in the 1920's; the property was subsequently abandoned.

References: (1, pp. 40-41) (4, pp. 165-166)

Map No. 21

Mine Name: Clarkdale Camp

MILS Sequence No.: 3202300433

Location: Sec. 3, T 8 S, R 45 E

County: Nye

Commodity: Gold, Silver

Production: U.S.B.M. records indicate that between 1936 and 1938, the mine produced 238 tons of ore yielding 45 ounces of gold, 32 ounces of silver. According to U.S.G.S. Bulletin 871, a shipment valued at less than \$1,000 was made in 1933.

Mining District: Tolicha (Clarksdale, Monte Cristo, Quartz Mountain)

Geology: The ore-bearing vein is in a brecciated shear zone in rhyolite.

Development: The vein is developed by six shafts within a distance of 700 feet.

Period of Activity: Gold was discovered about 1933 and the property was worked into the late 1930's. There was intermittent exploratory work done in the area after World War II.

References: (1, p. 41) (4, pp. 168-169) (15, p. 67)

Mine Name: Landmark-Life Preserver group

MILS Sequence No.: 3202300431

Location: Sec. 29, T 7 S, R 46 E

County: Nye

Commodity: Gold, Silver

Production: U.S.B.M. records indicate that the mine produced 391 tons of ore containing 482 ounces gold and 735 ounces silver between 1923 and 1940. Kral (4) reported that lessees shipped \$750,000 during the late 1930's; however, there is no record of such production.

Mining District: Tolicha (Clarkdale, Monte Cristo, Quartz Mountain)

Geology: Ore occurs in brecciated zones that have been recemented by cherty quartz in or parallel to a strong and continuous shear zone in silicified rhyolite flows.

Development: The Landmark workings include a 140-foot inclined shaft, a connecting adit, and laterals; total workings amount to 1,500 feet. The Life Preserver workings include several shallow shafts connecting workings totalling about 1,000 feet.

Period of Activity: Gold was discovered on the Life Preserver claims in 1917, and it was explored in 1920. The Landmark claims were actively worked in the 1930's.

References: (1, p. 41) (4, pp. 167-168)

Mine Name: Quartz Mountain

MILS Sequence No.: 3202300432

Location: Sec. 35, T 7 S, R 46 E

County: Nye

Commodity: Gold

Production: None reported

Mining District: Tolicha (Clarkdale, Monte Cristo, Quartz Mountain)

Geology: Apparently similar to the Landmark-Life Preserver group.

Development: Several shallow shafts, two caved adits, and trenching.

The vein was stoped near the surface for a distance of about 100 feet.

Period of Activity: Gold was discovered in 1905; more recent work was done in the 1930's.

Reference: (4, p. 168)

Mine Name: Yellow Gold (Carr's mine)

MILS Sequence No.: 3202300434

Location: Sec. 10, T 8 S, R 45 E

County: Nye

Commodity: Gold

Production: None reported

Mining District: Tolicha (Clarkdale, Monte Cristo, Quartz Mountain)

Geology: Free gold occurs in brecciated rhyolite that has been highly kaolinized and in places silicified with opaline silica. The gold is found in vugs containing small amounts of limonite indicating that it was originally associated with pyrite.

Development: Workings consist of a 150-foot adit, several large, open cuts, and an old shaft.

Period of Activity: Discovery was made during the 1930's and there was intermittent activity after World War II.

Reference: (4, p. 169)

Mine Name: Wyoming-Scorpion group

MILS Sequence No.: 3202300435

Location: Sec. 10, T. 8 S, R 45 E

County: Nye

Commodity: Gold, Silver

Production: None reported

Mining District: Tolicha (Clarkdale, Monte Cristo, Quartz Mountain)

Geology: Similar to the Yellow Gold property

Development: The property is developed by a 100-foot shaft and 40 feet of drifts.

Period of Activity: Apparently it was discovered about the time of the Yellow Gold and Clarkdale properties. Some exploration was done on the property after World War II.

Reference: (4, p. 169)

Map No. 22

Mine Name: Trappmans

MILS Sequence No.: 3202300674

Location: Sec. 12, T 5 S, R 47 E

County: Nye

Commodity: Gold, Silver

Production: None reported

Mining District: Trappmans

Geology: The district is in an area of Precambrian gneissic quartz monzonite and biotite schist. Gold and silver are found in quartz veins cutting the gneiss.

Development: Unknown

Period of Activity: The district was discovered in 1904 and Kral (4) reported that there has been no report of activity since.

References: (1, p. 41) (4, pp. 174-175) (12, pp. 137-139)

Map No. 23

Mine Name: Horn Silver mine

MILS Sequence No.: 3202300065

Location: Sec. 18, T 14 S, R 52 E

County: Nye

Commodity: Silver, Gold

Production: None reported

Mining District: Wahmonie

Geology: Apparently the precious metals occurred in or along quartz veins in an area of hydrothermally-altered latite to dacite lava flows, tuffs, volcanic breccias of the Salyer and Wahmonie Formations.

Development: The extent of the workings is not known, but Johnson reported that "...judging from the size of the shaft, the mine operated on a fairly large scale at one time" (15, p. 381).

Period of Activity: The mine was noted by Ball (12) in 1905.

References: (1, p. 41) (4, p. 206) (12, p. 147) (16, p. 381)

Mine Name: Lucky group

MILS Sequence No.: 3202300069

Location: Sec. 15, T 15 S, R 50 E

County: Nye

Commodity: Copper

Production: Kral (4) reported that a trial shipment was made, but returns were not available.

Mining District: Wahmonie

Geology: The copper occurs as a carbonate in 500-foot-long and 1- to 4-foot-wide shear zones in quartzite.

Development: In 1950, a 140-foot adit-drift was being driven.

Period of Activity: The prospect was discovered in 1946. It was active in 1950.

Reference: (4, p. 207)

Mine Name: Travertine deposit

MILS Sequence No.: 3202300068

Location: Sec. 10, T 13 S, R 53 E

County: Nye

Commodity: Travertine (building stone?)

Production: None reported

Mining District: Wahmonie

Geology: A 4- to 5-foot zone of travertine occurs in Cambrian limestone.

Development: The travertine is exposed by several open cuts or trenches.

Period of Activity: Unknown, but probably prior to World War II.

Reference: (4, p. 207)

Mine Name: Wahmonie property (Sylvanite group)

MILS Sequence No.: 3202300066

Location: Sec. 17, T 13 S, R 53 E

County: Nye

Commodity: Silver, Gold

Production: The amount is unknown; however, it was probably small.

Mining District: Wahmonie

Geology: The geology is presumably similar to the Silver Horn mine. Some \$32 (per ton) ore was reportedly found on the 65-foot level.

Development: Workings include a 500-foot shaft; all surface buildings have been removed.

Period of Activity: The district was discovered prior to 1905 and rediscovered in the 1920's. A strike of high-grade silver-gold was made in 1928.

Reference: (4, p. 207)

Map No. 24

Mine Name: Golden Chariot group

MILS Sequence No.: 3202300078

Location: Sec. 18, T 4 S, R 47 E

County: Nye

Commodity: Gold, Silver, Copper

Production: A few tons of ore valued at about \$200 per ton (\$20.67 per ounce gold) was shipped in 1908.

Mining District: Wellington (Jamestown, O'Briens)

Geology: Gold and silver ore with some copper occurs in quartz veins in rhyolite. The ore is "bunchy" but often high-grade.

Development: In 1951, the workings included a 300-foot shaft with headframe and hoist.

Period of Activity: The mine was worked during the early 1900's; Kral (4) reported that there has been no activity in many years.

References: (1, p. 41) (4, p. 212)

Mine Name: Hammel (Guy Puh property, Franz Hammel mine)

MILS Sequence No.: 3202300179

Location: Sec. 34, T 4 S, R 45 E

County: Nye

Commodity: Gold, Silver, Copper

Production: None reported

Mining District: Wellington (Old Jamestown, O'Briens)

Geology: Rhyolite and andesite are cut by a quartz vein averaging from a few inches to a foot or more in thickness. The vein has been brecciated and the interstices filled with calcite and limonite. In the oxidized portion, the ore contains free-milling gold with a little silver; in the sulfide zone, the ore contains gold associated with pyrite.

Development: The workings consist of a 30-foot inclined shaft and a 150-foot vertical shaft.

Period of Activity: Locations were made in the late 1920's and early 1930's. It was active in 1946 and 1947.

References: (1, p. 41) (4, pp. 211-212) (23)

Mine Name: Mohawk, Daisy and Last Chance Claim

MILS Sequence No.: 3202300079

Location: Sec. 18, T 4 S, R 47 E

County: Nye

Commodity: Gold, Silver

Production: None reported

Mining District: Wellington (Jamestown, O'Briens)

Geology: the mineral occurrence is reported to be similar to the other properties in the district.

Development: The workings include a 200-foot shaft.

Period of Activity: Unknown

Reference: (4, p. 212)

Mine Name: Surprise group

MILS Sequence No.: 3202300077

Location: Sec. 2, T 5 S, R 46 E

County: Nye

Commodity: Gold, Silver

Production: Kral (4) reported about 100 tons were shipped, but no values given. U.S.B.M. has no record of production.

Mining District: Wellington (Jamestown, O'Briens)

Geology: Gold- and silver-bearing quartz veins and stringers are found in a diorite intrusive overlain by rhyolite flows.

Development: The veins have been explored by a 100-foot and a 30-foot shaft in addition to several open cuts and trenches.

Period of Activity: Unknown

References: (1, p. 41) (4, p. 212)

Map No. 24

Mine Name: White Caps mine

MILS Sequence No.: 3200300325

Location: Sec. 9, T 16 S, R 61 E

County: Clark

Commodity: Lead

Production: None reported

Mining District: White Caps(?)

Geology: A mineralized porphyry dike in limestone beds in the Ophir shale strikes from the northwest into the south end of the claims.

Development: Surface prospecting only

Period of Activity: Prior to and during World War II

Reference: (33)

Map No. 26

Mine Name: Pittsburg group

MILS Sequence No.: 3202300088

Location: Sec. 27, T 4 S, R 58 E

County: Nye

Commodity: Silver, Gold

Production: None reported

Mining District: Wilsons (Wilson's Camp)

Geology: Tertiary rhyolite country rock is cut by quartz veins containing silver and gold with trace amounts of copper. Assays of \$110 to \$180 per ton in gold and silver have been reported.

Development: The workings include a 425-foot adit and a 300-foot shaft with 40 feet of laterals on the 100-foot level, 175 feet on the 200-foot level, and 350 feet on the 300-foot level.

Period of Activity: Unknown

References: (1, p. 41) (4, p. 218)

Map Name: Unknown

MILS Sequence No.: 3202300675

Location: Sec. 35, T 4 S, R 47 E

County: Nye

Commodity: Silver, Gold(?)

Production: None reported

Mining District: Wilsons (Wilson's Camp)

Geology: Near-surface enrichment of oxidized silver minerals in a 4-foot quartz vein in rhyolite.

Development: Old workings include a 150-foot inclined shaft and a 100-foot adit.

Period of Activity: Kral (4) stated that the condition of workings and buildings indicate that the property may have been active in the 1930's.

Reference: (4, p. 218)

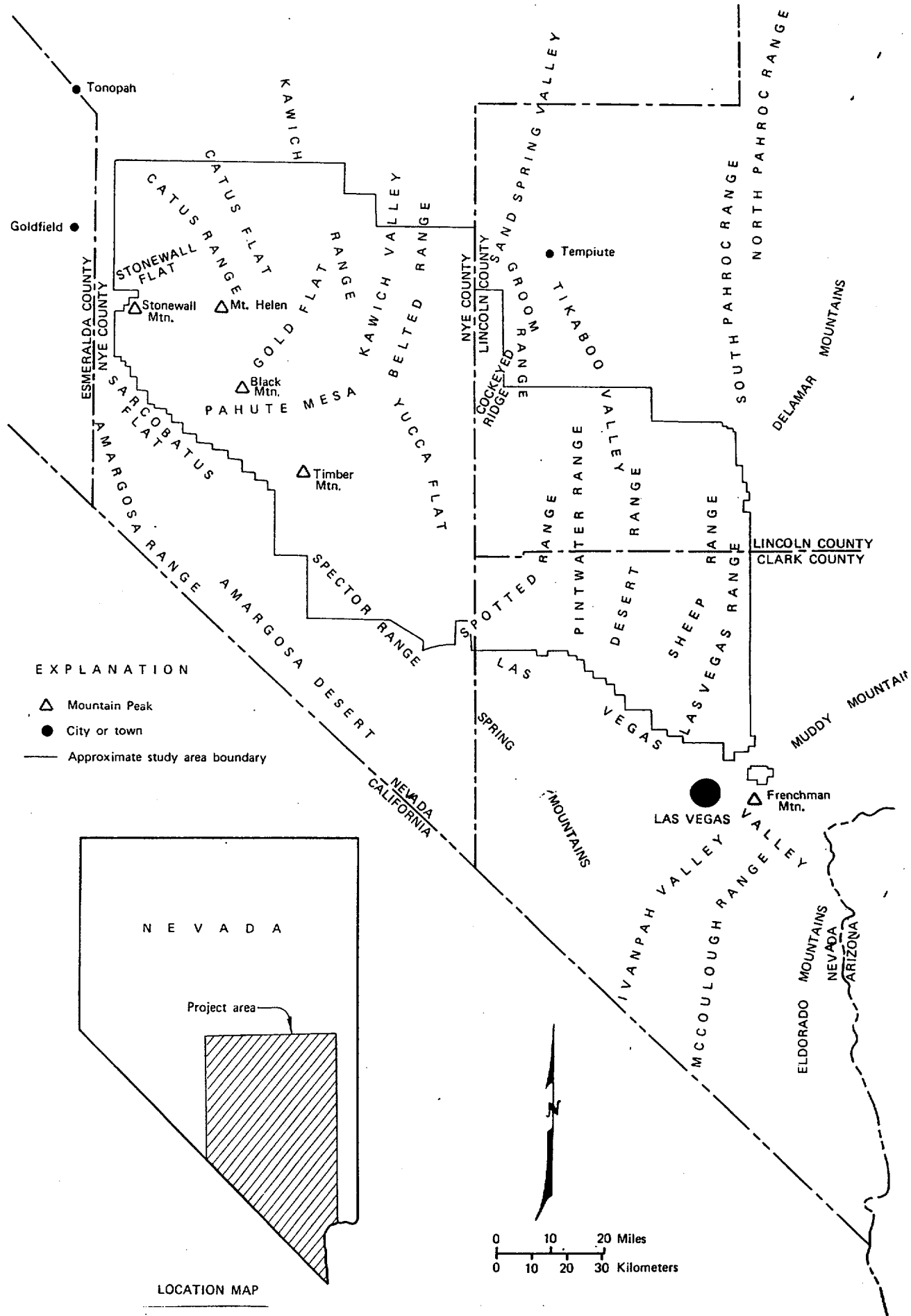


Figure 1. Mountain ranges and basins of southern Nevada in the vicinity of the Nellis Air Force Base and the Nellis Bombing and Gunnery Range.

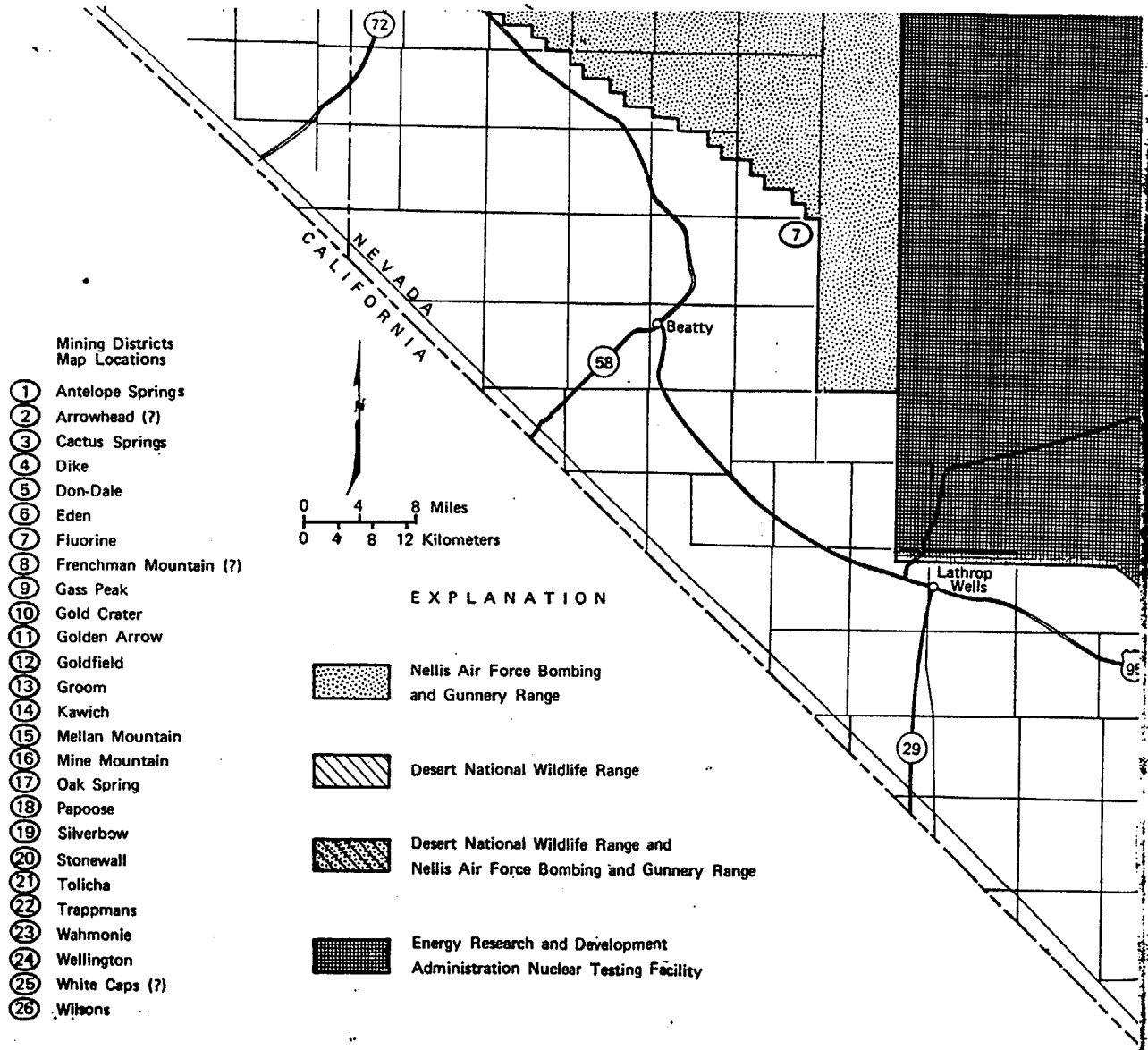


Figure 2. Mining districts in Nevada, California, and the Nellis Air Force Base and the Lincoln and Nevada National Guard

R 43 E R 44 E R 45 E R 46 E R 47 E R 48 E R 49 E R 50 E R 51 E

Tonopah

NYE CO.
ESMERALDA CO.

Goldfield

Scotts
Junction

89

3

72

6

11

19

15

1

26

22

24

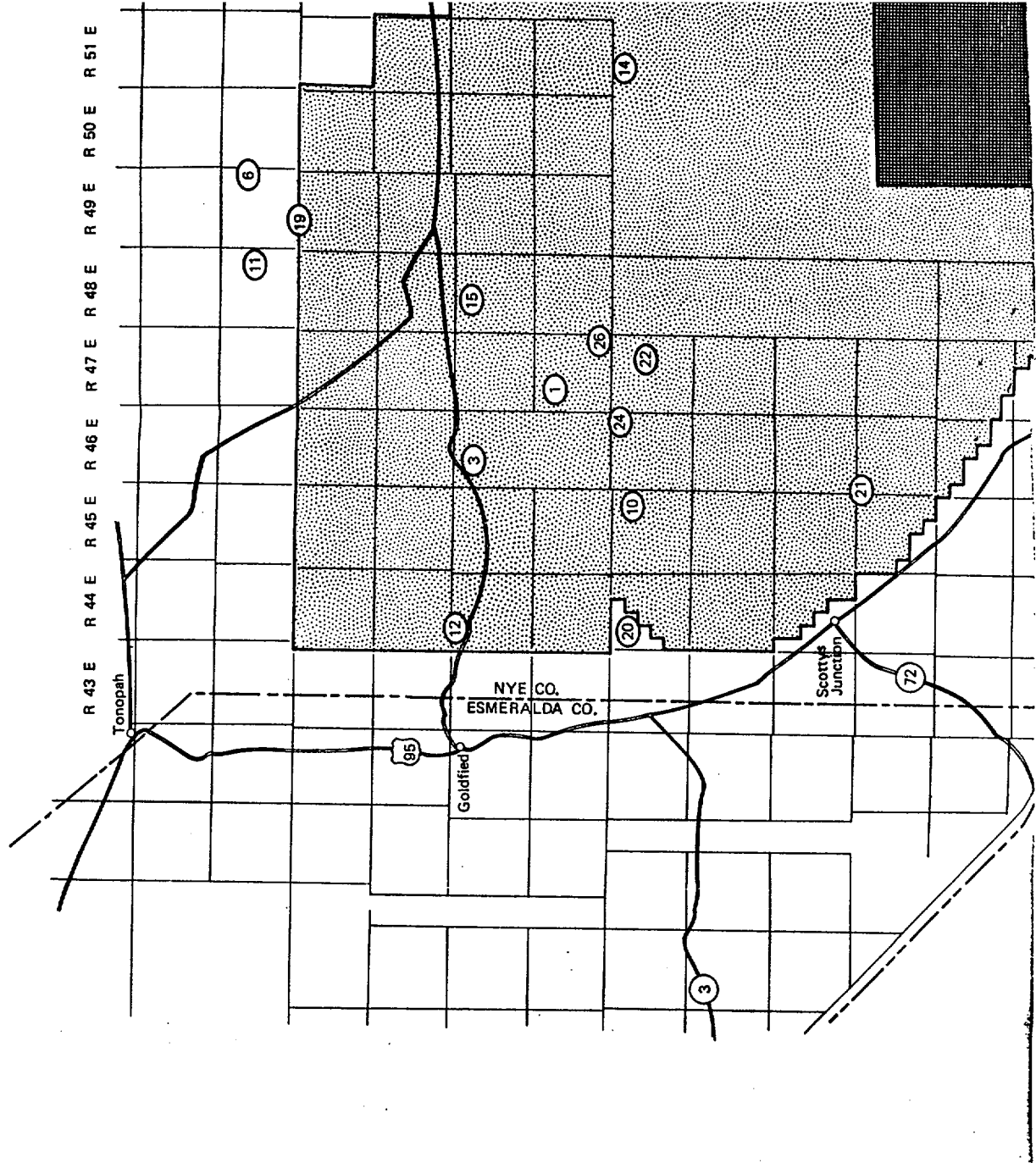
10

21

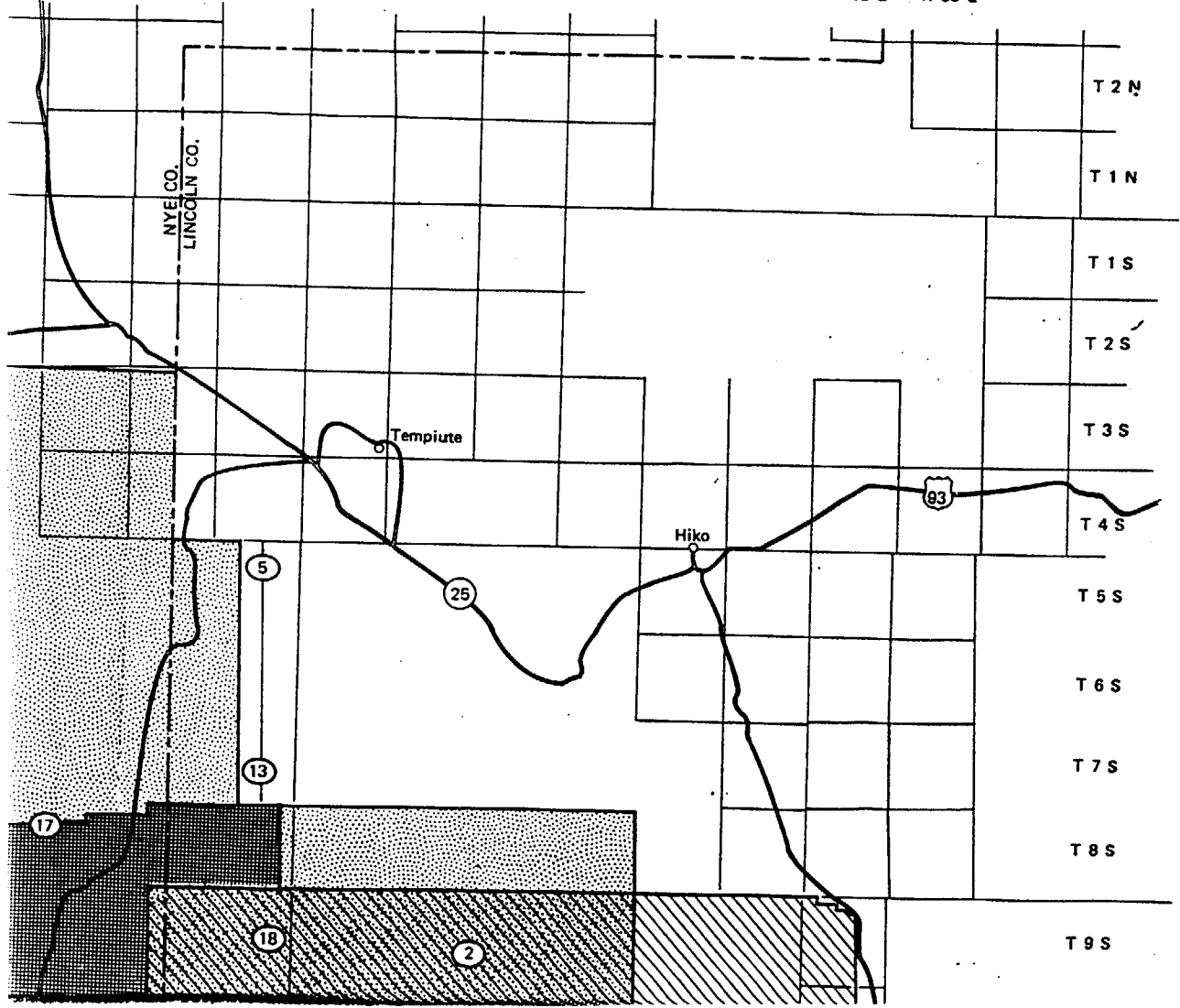
12

20

14



R 53 E R 54 E R 55 E R 56 E R 57 E R 58 E R 59 E R 60 E R 61 E R 62 E R 63 E



T 2 N

T 1 N

T 1 S

T 2 S

T 3 S

T 4 S

T 5 S

T 6 S

T 7 S

T 8 S

T 9 S

NYE CO.
LINCOLN CO.

Tempiute

Hiko

5

25

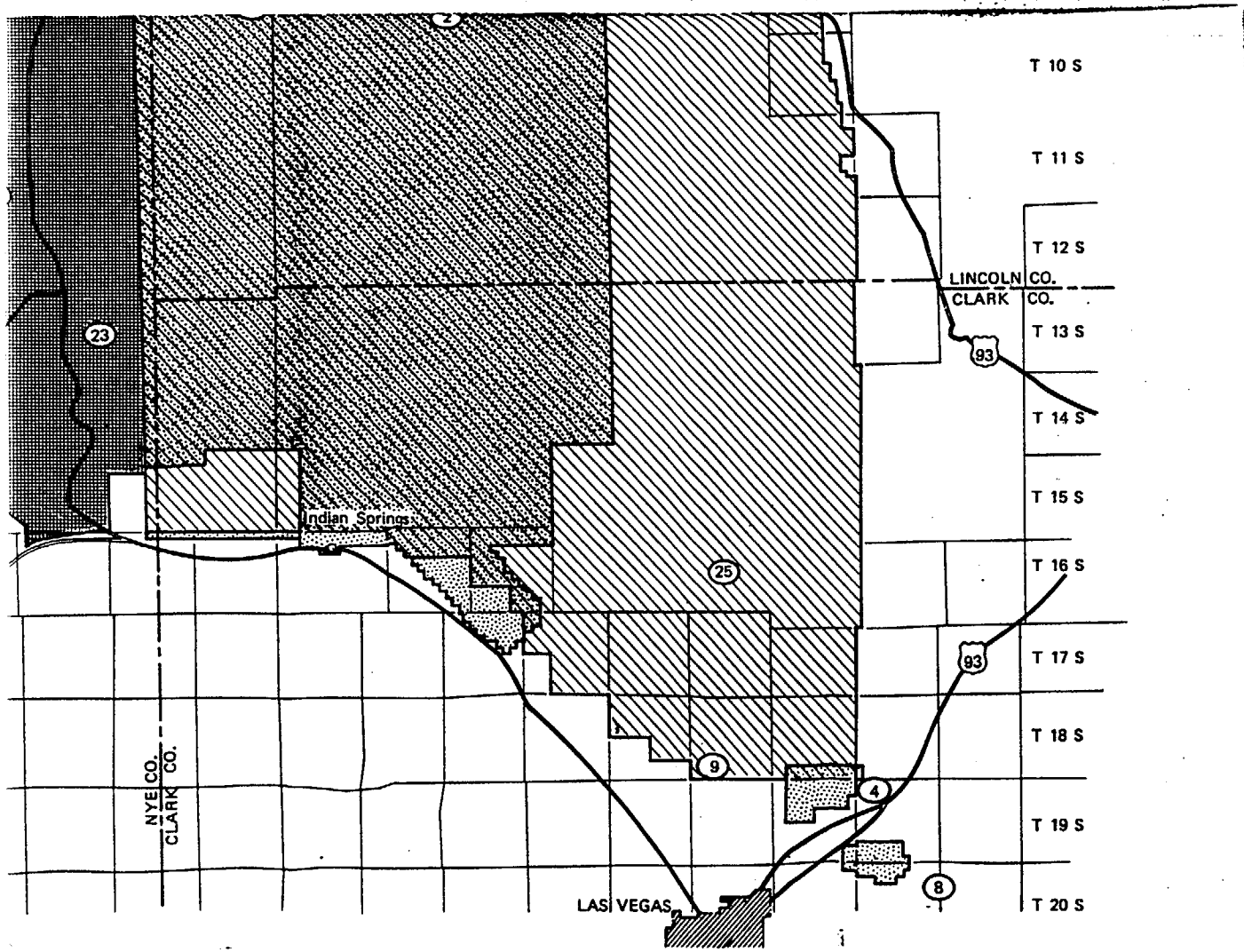
93

13

17

18

2



T 10 S

T 11 S

T 12 S

LINCOLN CO.
CLARK CO.

T 13 S

T 14 S

T 15 S

T 16 S

T 17 S

T 18 S

T 19 S

T 20 S

23

Indian Springs

25

9

4

8

93

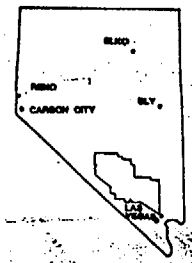
93

NYE CO.
CLARK CO.

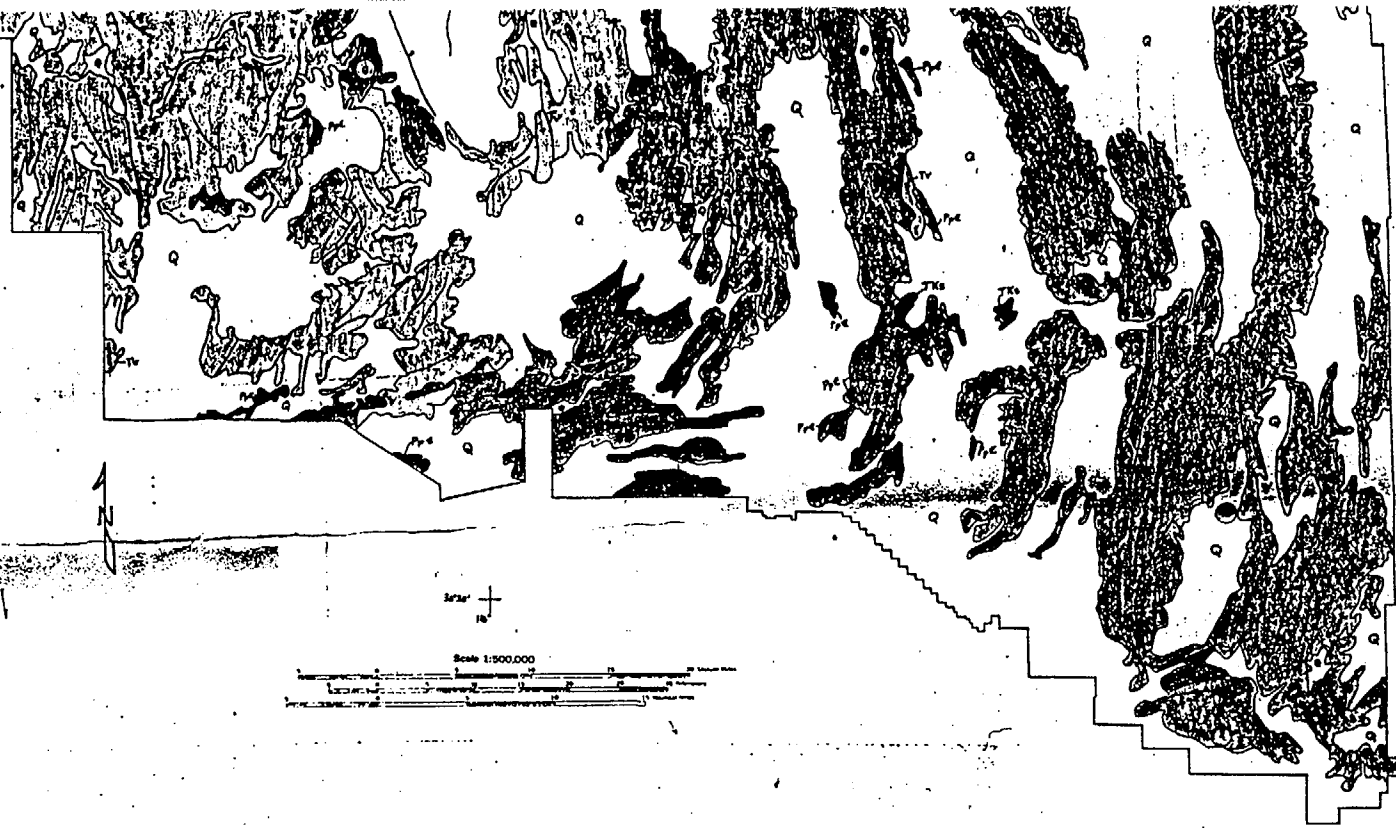
LAS VEGAS

37' +
15'W'

- 3 CACTUS SPRINGS
- 4 BASS PEAK
- 5 GOLD CRATER
- 6 GOLDFIELD
- 7 KANON
- 8 MELLAN MOUNTAIN
- 9 MIKE MOUNTAIN
- 10 OAK SPRING
- 11 PAPOOSE
- 12 SILVERBOW
- 13 STONEHALL
- 14 TOLONA
- 15 TRAPPINGS
- 16 WADSWORTH
- 17 WELLINGTON
- 18 WHITE GAFF
- 19 WILSON



INDEX MAP OF NEVADA SHOWING
LOCATION OF THE STUDY AREA



37' +
15'

Scale 1:500,000

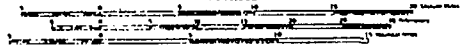
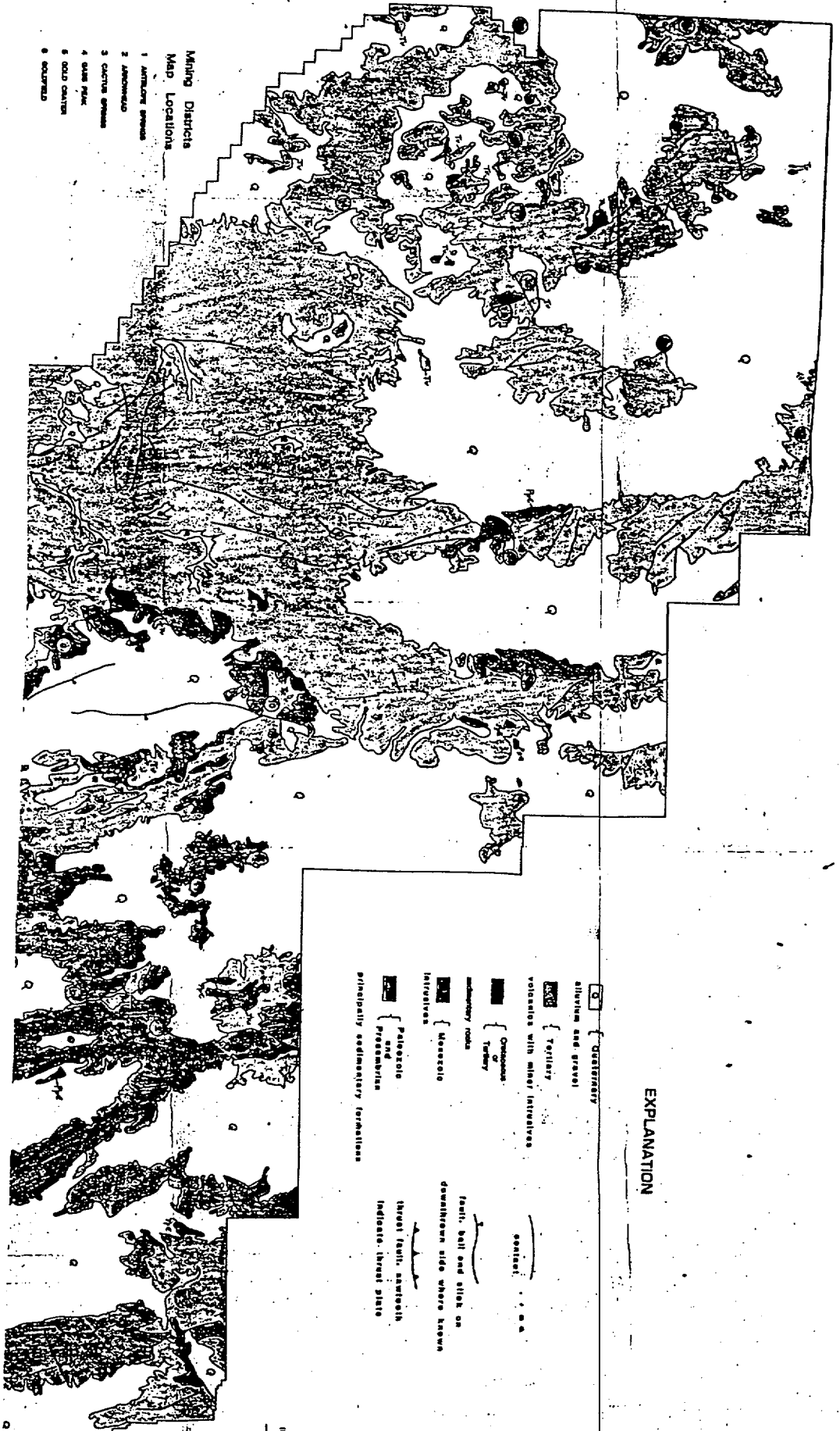


Figure 3. Generalized geology of the Nellis Air Force Base and the Nellis
Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties,
Nevada.





**Mining Districts
Map Locations**

1. ARLINGTON SPRINGS
2. JAMESVILLE
3. OCTOBER SPRINGS
4. SAGE FISH
5. GOLD CREEK
6. GOLDEN

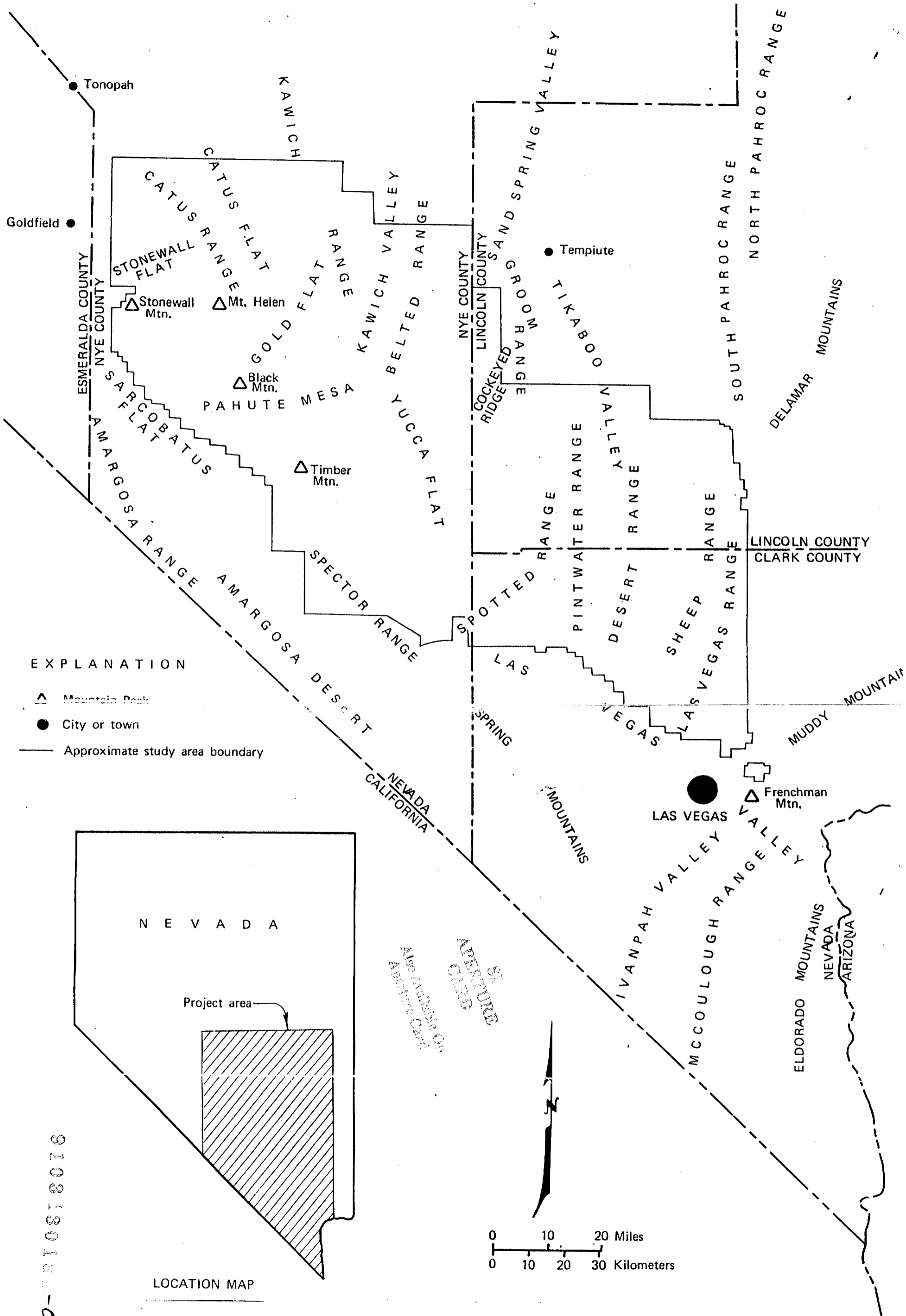
EXPLANATION

- Quaternary alluvium and gravel
- ▨ Tertiary volcanics with sheet intrusives
- ▩ Cretaceous or Tertiary intrusives
- ▧ Paleozoic and Proterozoic principally sedimentary formations
- contact
- fault, belt and slick on downthrown side where known
- thrust fault, northeast indicates thrust plate

37°

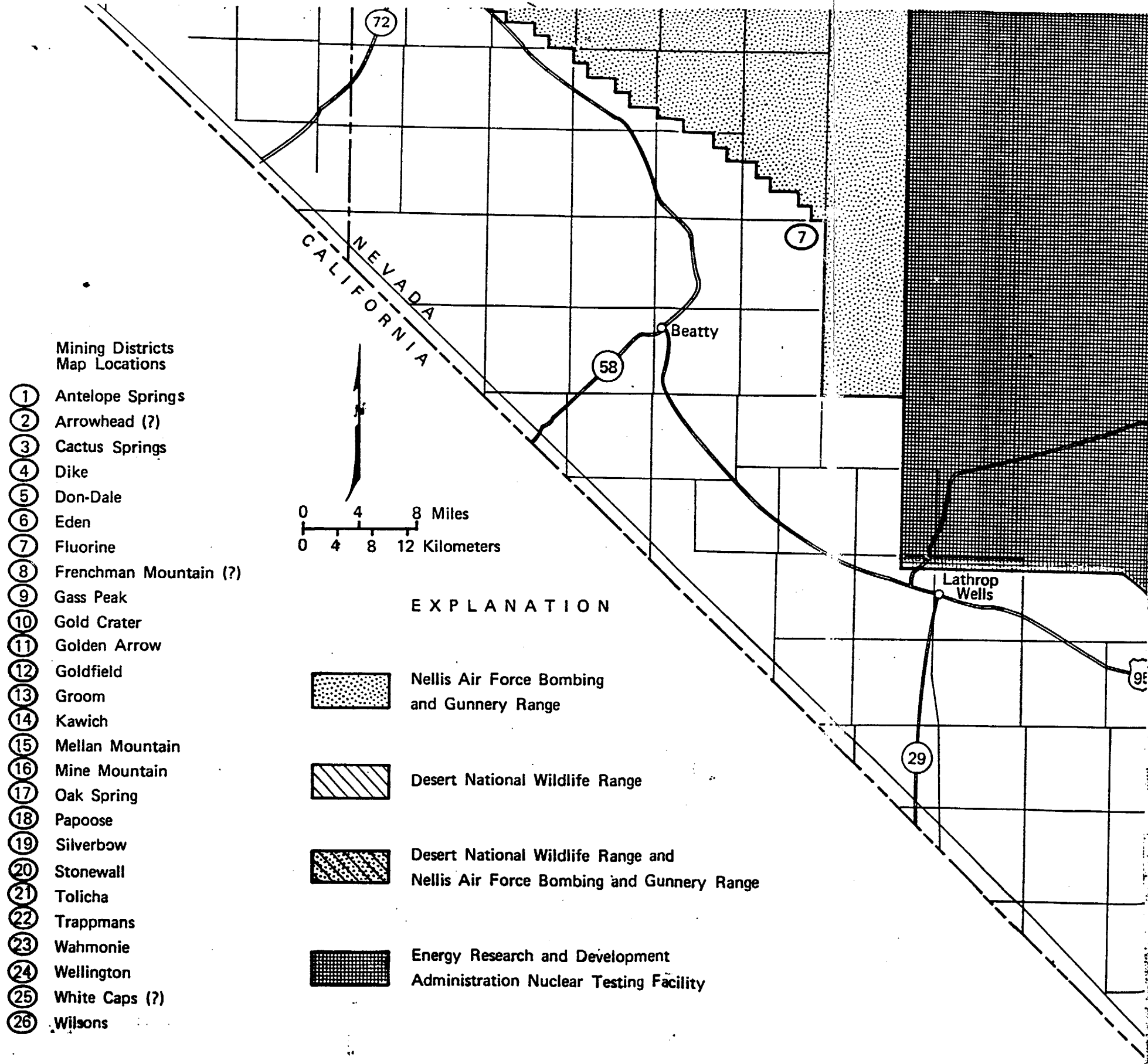


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Figure 1. -Mountain ranges and basins of southern Nevada in the vicinity of the Nellis Air Force Base and the Nellis Bombing and Gunnery Range.



- Mining Districts
Map Locations**
- ① Antelope Springs
 - ② Arrowhead (?)
 - ③ Cactus Springs
 - ④ Dike
 - ⑤ Don-Dale
 - ⑥ Eden
 - ⑦ Fluorine
 - ⑧ Frenchman Mountain (?)
 - ⑨ Gass Peak
 - ⑩ Gold Crater
 - ⑪ Golden Arrow
 - ⑫ Goldfield
 - ⑬ Groom
 - ⑭ Kawich
 - ⑮ Mellan Mountain
 - ⑯ Mine Mountain
 - ⑰ Oak Spring
 - ⑱ Papoose
 - ⑲ Silverbow
 - ⑳ Stonewall
 - ㉑ Tolicha
 - ㉒ Trappmans
 - ㉓ Wahmonie
 - ㉔ Wellington
 - ㉕ White Caps (?)
 - ㉖ Wilsons

EXPLANATION

-  Nellis Air Force Bombing and Gunnery Range
-  Desert National Wildlife Range
-  Desert National Wildlife Range and Nellis Air Force Bombing and Gunnery Range
-  Energy Research and Development Administration Nuclear Testing Facility

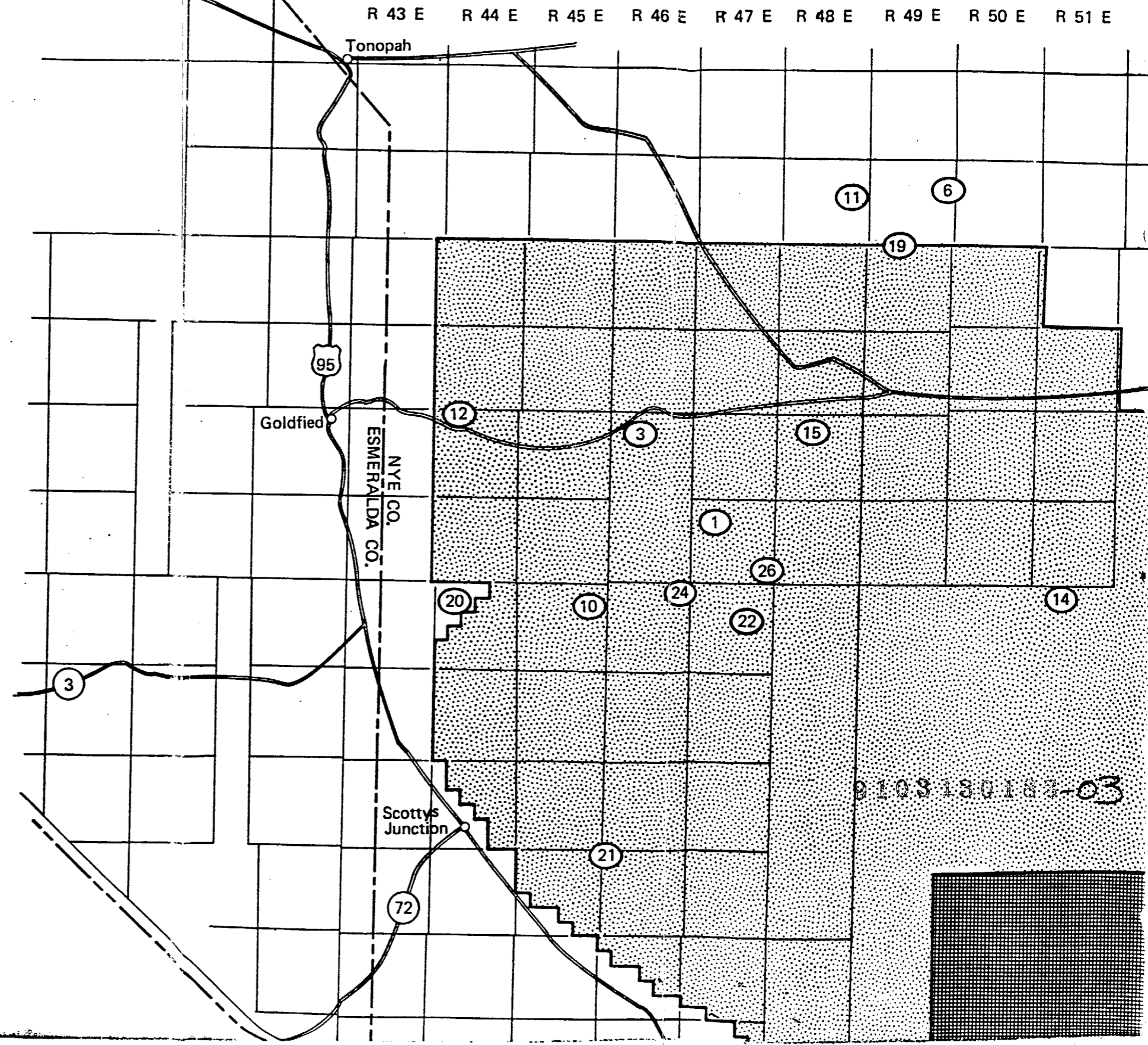
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CARD
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Figure 2. -Mining districts
Base and the
Lincoln and N

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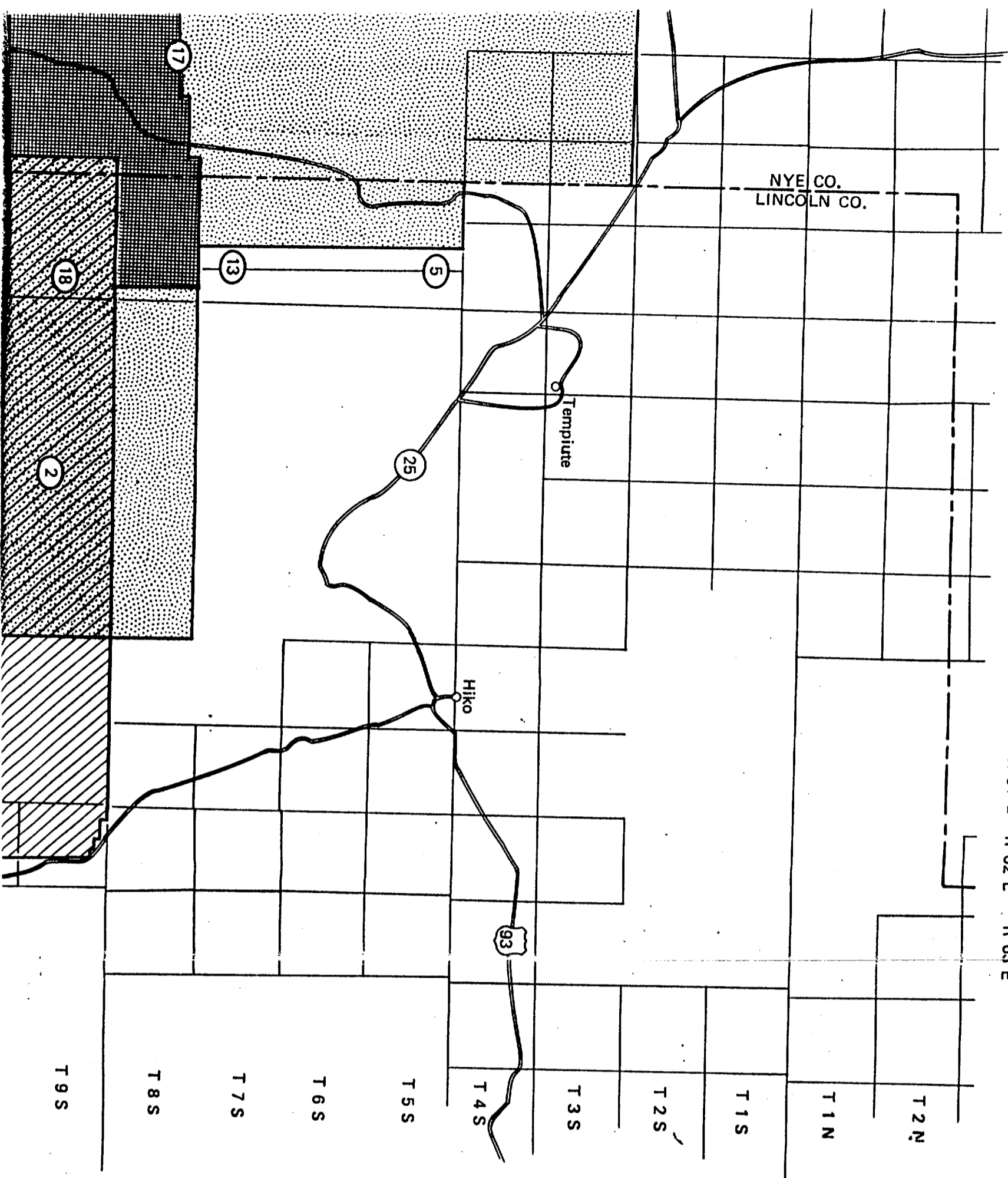
52 E R 53 E R 54 E R 55 E R 56 E R 57 E R 58 E R 59 E R 60 E R 61 E R 62 E R 63 E

NYE CO.
LINCOLN CO.

Tempiute

Hiko

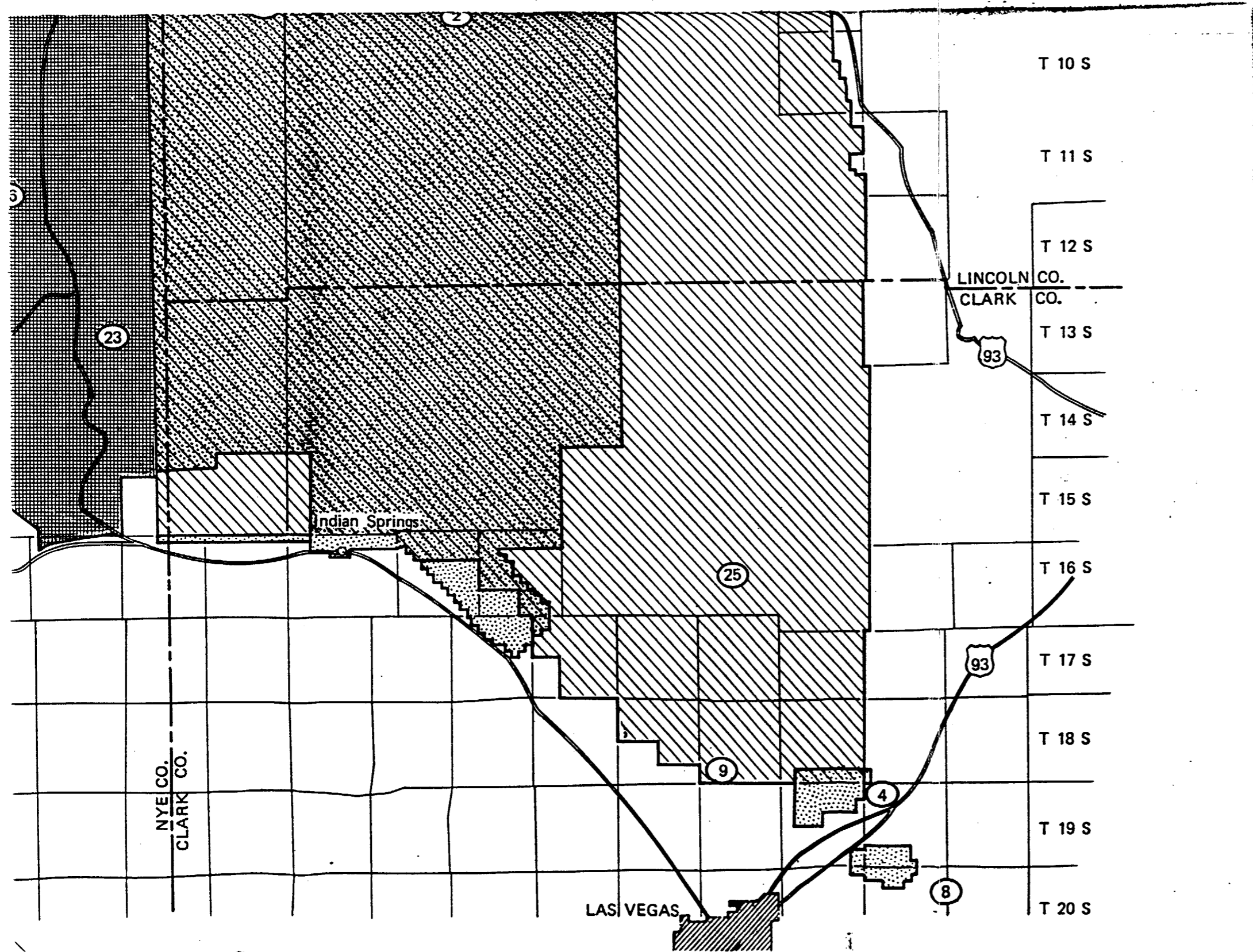
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T 7 S
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T 9 S



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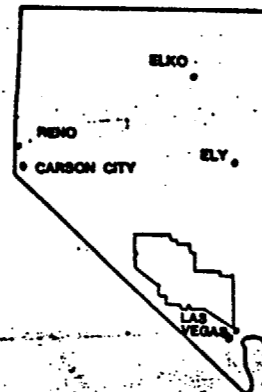


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37°
116°15'

- 3 CACTUS SPRINGS
- 4 GABS PEAK
- 5 GOLD CRATER
- 6 GOLDFIELD
- 7 KAWICH
- 8 MELLAM MOUNTAIN
- 9 MINE MOUNTAIN
- 10 OAK SPRING
- 11 PAPOOSE
- 12 SILVERBOW
- 13 STONEWALL
- 14 TOLICHA
- 15 TRAPPIANS
- 16 WAHMONE
- 17 WELLINGTON
- 18 WHITE CAPE
- 19 WILSON



INDEX MAP OF NEVADA SHOWING
LOCATION OF THE STUDY AREA

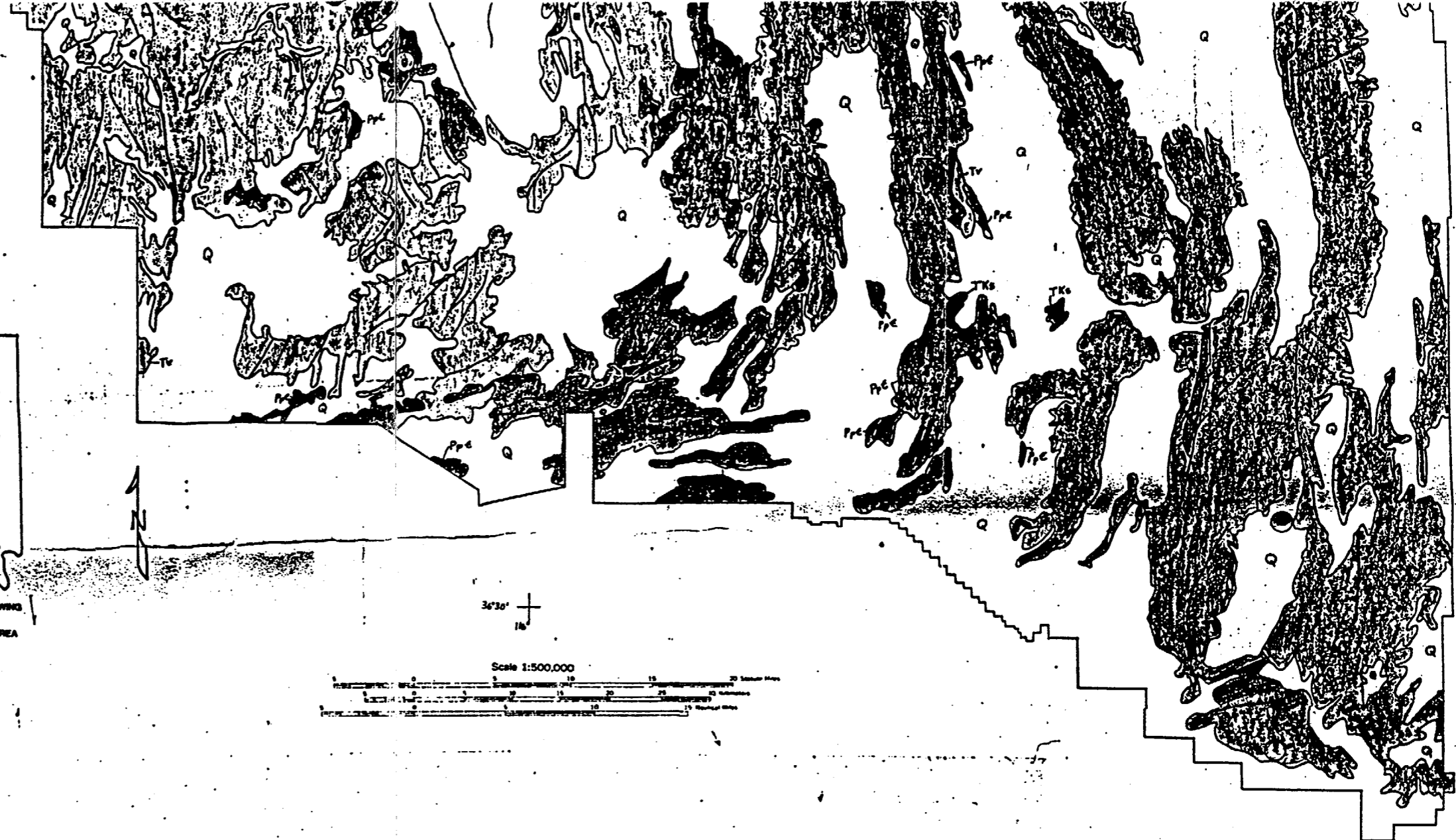


Figure 3. Generalized geology of the Nellis Air Force Base and the Nellis
Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties,
Nevada.

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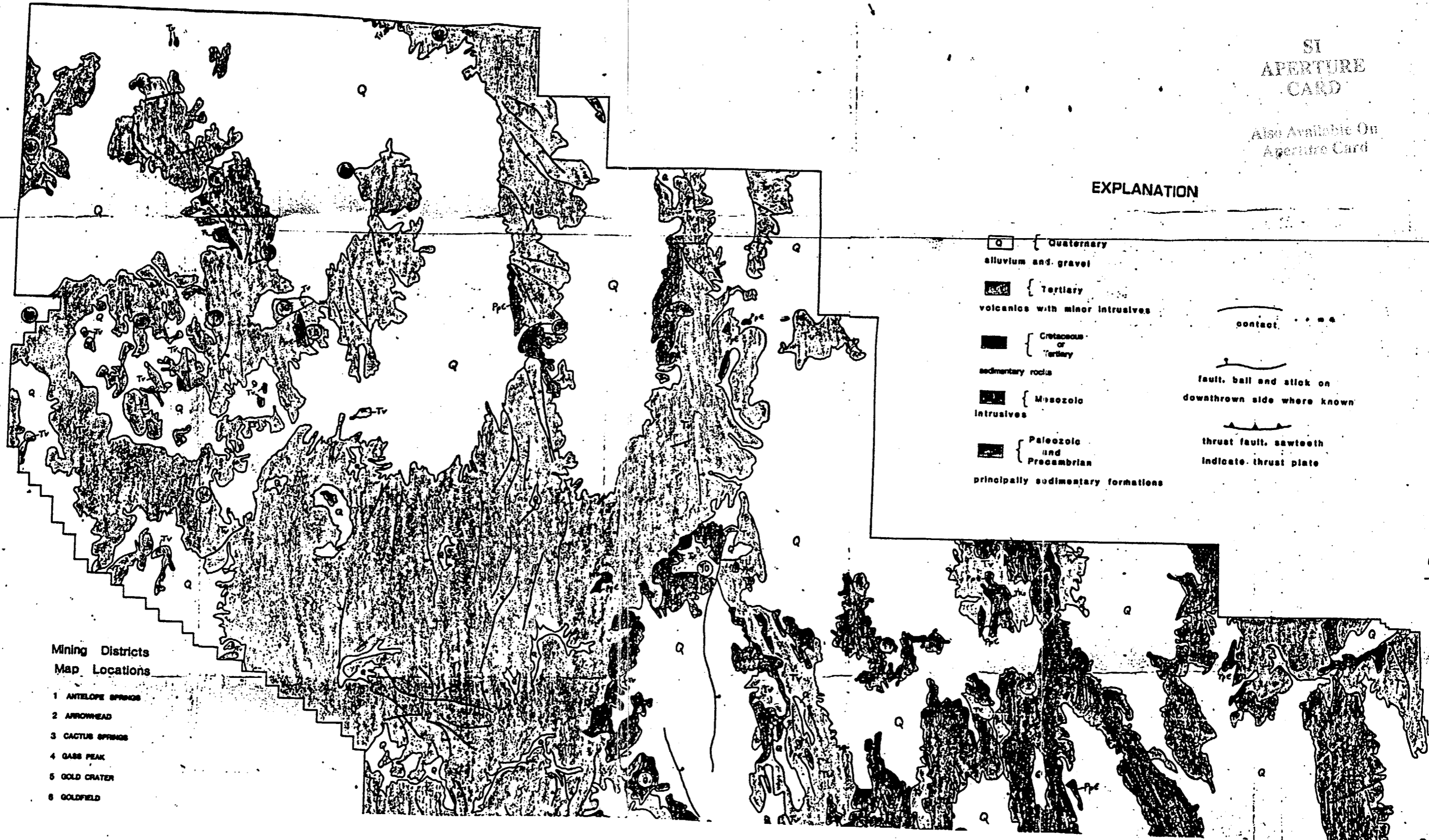
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EXPLANATION

- Quaternary
alluvium and gravel
- ▨ Tertiary
volcanics with minor intrusives
- Cretaceous
or
Tertiary
sedimentary rocks
- ▩ Mesozoic
intrusives
- Paleozoic
and
Precambrian
principally sedimentary formations

- contact
- fault, ball and stick on
downthrown side where known
- thrust fault, sawtooth
indicate thrust plate



Mining Districts
Map Locations

- 1 ANTELOPE SPRINGS
- 2 ARROWHEAD
- 3 CACTUS SPRINGS
- 4 GASS PEAK
- 5 GOLD CRATER
- 6 GOLDFIELD

37°
118°15'

9103130183-07