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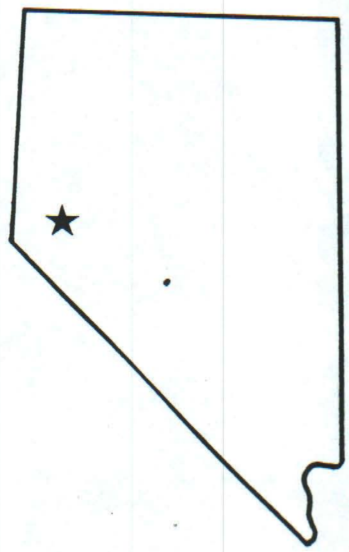
ITEM 33

MINERAL RESOURCE EVALUATION OF THE ADDITION TO THE PROPOSED MASTER LAND WITHDRAWAL AT NAVAL AIR STATION FALLON, CHURCHILL COUNTY, NEVADA



BUREAU OF MINES
WESTERN FIELD OPERATIONS CENTER

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by
Richard J. Thompson

U.S. Bureau of Mines
Western Field Operations Center

August 1992

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1.0 Introduction

The initial mineral resource evaluation and socioeconomic study of the proposed Master Land Withdrawal (MLW) on 181,323 acres adjacent to Naval Air Station Fallon (NAS Fallon) training ranges in Churchill County, Nevada was completed in 1990. Approximately 7,750 acres of adjoining land is being proposed for withdrawal by the Navy. These areas have been identified as public health hazards and as necessary for continued Navy tactical training.

The Bureau of Mines (BOM) has been requested to complete the mineral resource evaluation and socioeconomic study on Bureau of Land Management (BLM) managed lands proposed for withdrawal. The findings and evaluation will then be forwarded to the Navy for inclusion in their revised Environmental Impact Statement.

1.1 Location of Study Areas

Figure 1 illustrates the location of the additions to the proposed MLW studied in this report. These areas are labeled Area 1, Area 2, and Area 3. The additional areas total approximately 7,750 acres and are contiguous to the original military reservations.

A fourth area, labeled Area 4, was covered in the initial report (Thompson and Boleneus, 1990) but is further discussed in this report because of recently acquired mineral information. It should be noted that the Wildhorse claim group was incorrectly identified as the Whitehorse claim group in the original report (Thompson and Boleneus, 1990).

1.2 Purpose of Study

The purpose of this study is to evaluate the mineral resources of known deposits and occurrences and to report the potential for yet unidentified resources within the proposed withdrawal area.

Prior to the withdrawal of more than 5,000 acres of public lands from mineral entry, section 204 (c) of the Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1714) requires that a mineral report be prepared. The report is to include information on the geology of known mineral deposits, past and present mineral production, mineral interest in the area, evaluation of future mineral potential, and potential market demands.

1.3 Mechanism of the Study

Mineral knowledge of the study area and past exploration within the study areas have largely been influenced by deposit types (models) found to exist in those

ABBREVIATIONS

Au	gold
Ag	silver
opt	Troy ounces per ton (precious metals)
% per ton	percentage of non-precious metal per short ton (2,000 pounds)
stu	short ton unit which is equal to 20 pounds (1%) per short ton
NaCN	Sodium cyanide
gms/cm^3	grams per cubic centimeter
gms	grams
ft	feet
ft^3/ton	cubic feet per ton

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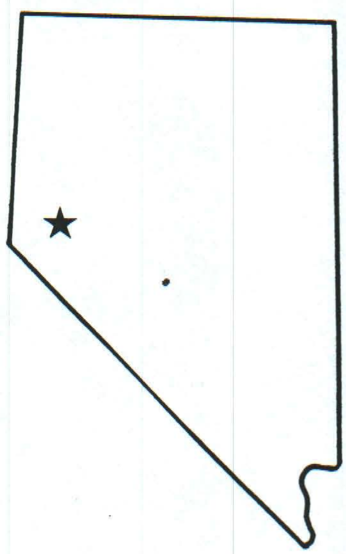

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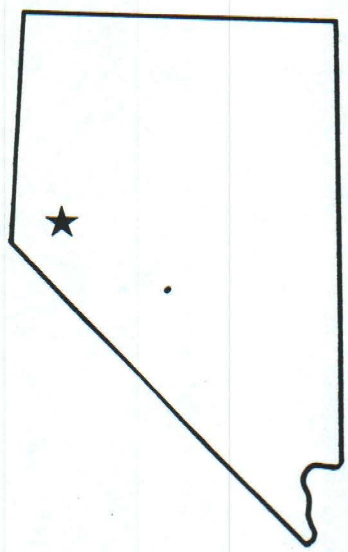

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E X P L A N A T I O N

Distribution of classified resources

Resource classification

Indentified resource	■
Indicated resource	▲
Inferred resource	●
Existing range	B-17
MLW area	
Addition to proposed MLW	
Mining district outline	

Mines and Prospects by district, proposed MLW

Fairview District
1. Centurion claim group
2. Nevada Hills mine
3. Mizpah and Jelinek mines area
4. Gold Coin and Bluff mines area
5. Jet claim group
6. Rex claim group/Nevada Crown mine area
7. Huntsman/Placer Dome claim group

Chalk Mountain District
8. Nevada Chalk Mountain mine
9. Chalk Mountain mine
10. Unidentified claim group

Wonder District
11. Nevada Wonder mine
12. Silver Center mine
13. Gold King claim group
14. Spider & Wasp mine
15. Dickey Peak area mines

La Plata District
16. La Plata claim group
17. Dixie fluorite mine
18. La Plata project
19. Elevenmile adit
20. Elusive claim group

Sand Springs District
21. Summit King mine

[illegible]

Holy Cross District
23. Cinnabar Hills mine

Camp Gregory District
24. Red Camel claim group
25. Wildhorse claim group

Discussion Areas, addition to proposed MLW

Area 1

Area 2

Area 3

Area 4

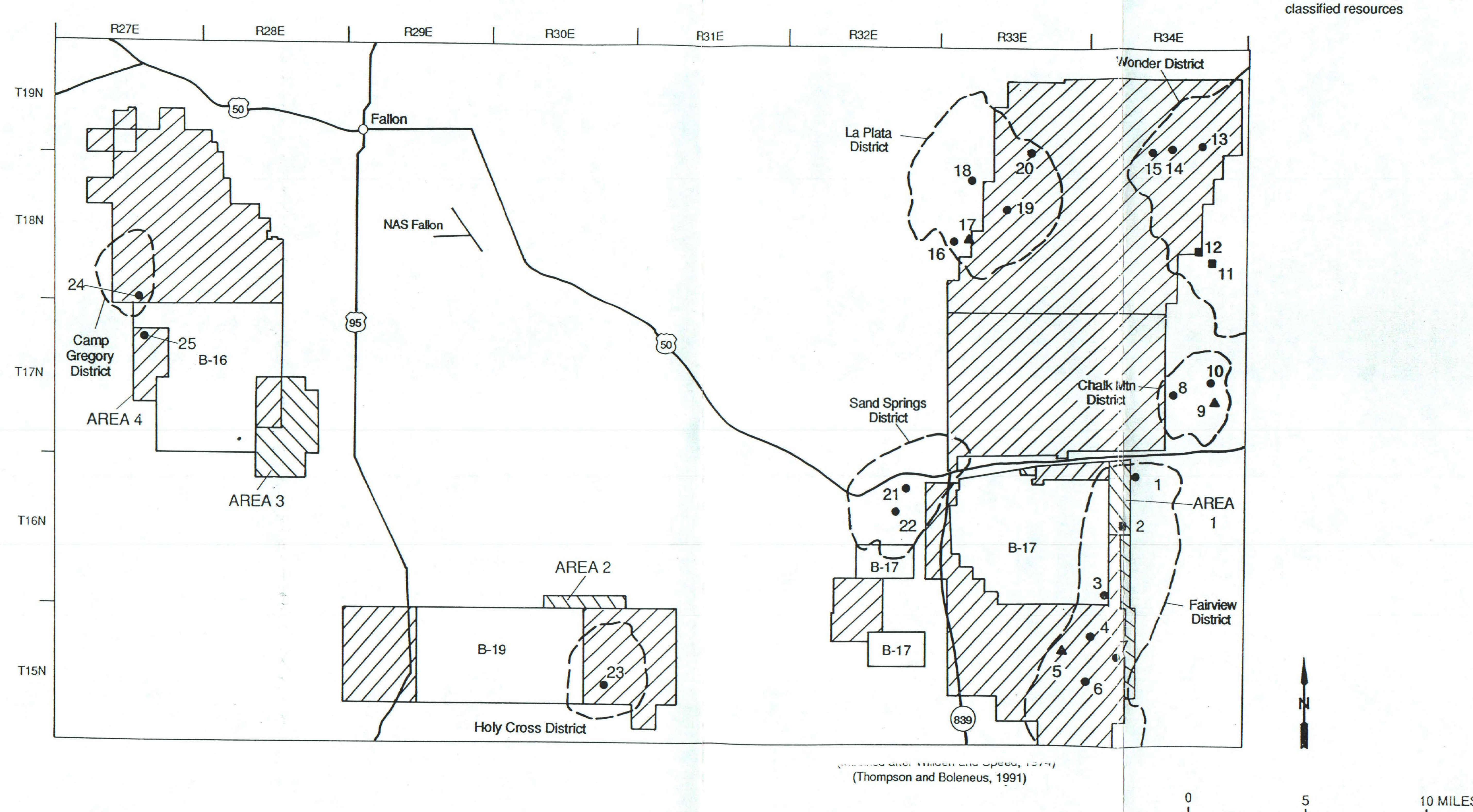

FIGURE 1.-General location map of the original military reservations, the proposed MLW, the additions to the proposed MLW, NAS Fallon, mining districts, and classified resources

mining districts that border the proposed additional withdrawal. Examples of mineral commodities known to exist near the study areas in significant quantities include gold, silver, tungsten, lead, zinc, copper, fluorite, and diatomite. (Thompson and Boleneus, 1990)

The approximately 7,750 acres were field checked to ascertain general geologic relationships. At the same time, the necessary rock samples were obtained for resource evaluation.

Also, BLM records were checked for the existence of mining claims (tables 1 and 2) within the proposed additions. Claim-owners with a significant number of claims were contacted to notify them of the BOM field program. The claim owners were requested to share any data as a supplement to BOM data. The Wildhorse claim owners did share some of their data which was incorporated into this report.

1.4 Legal

Mineral commodities are classified by law into three distinct groups: Locatables, leaseables, and salables. Locatable minerals are those minerals which, when found in valuable deposits, can be acquired under the General Mining Laws of 1872, as amended (17 Stat. 91; 30 U.S.C. 22 et seq.). Examples of locatable minerals occurring on public lands within the proposed MLW include, but are not limited to, those minerals containing gold, silver tungsten, fluorite, copper, lead, and zinc. Uncommon varieties of limestone, diatomite, and other minerals, having unique and special values, are also locatables.

Under the General Mining Law of 1872, U.S. citizens have a statutory right to explore vacant, unreserved public lands for locatable minerals. Possessory rights are obtained by staking a claim on open or unreserved federal lands. A lode claim can be any size up to a maximum of 600 feet by 1,500 feet. The legal concept of Pedis Possessio (Maley, 1978, p. 46) protects the claim owner from mineral entry by others onto his claim while he is actively seeking a discovery.

In order to maintain an unpatented claim, the claim owner must expend a minimum of $100.00 worth of meaningful labor on his claim per year directed at making a discovery. This work record (affidavit of assessment work) must be filed with the county recorder and the Bureau of Land Management within certain time constraints (Evans, et al, 1990, p. 33-41).

A discovery is defined as mineral in place having sufficient value to pass "the prudent man rule" and "the marketability test" (Maley, 1978, p. 47). Upon making a discovery, as attested to by an agency mineral examiner, a claim owner now has a valid unpatented lode claim.

Table 1.-- Unpatented Mining Claims, Addition to Proposed MLW, NAS Fallon

Section	Township	Range	Claim Name	Type of Claim	Number of claims effected	Date staked	Claim owner
4	T 16 N	R 34 E	Centurion 1-3, 5, 6	Mill Site	5	03-25-84	Payne, Anthony
4	T 16 N	R 34 E	Centurion 7-18	Lode	12	03-25-84	do..
4	T 16 N	R 34 E	EQF 9, 11, 30-36, 42	Lode	10	09-19-87	Sindor, Inc.
5	T 16 N	R 34 E	Centurion 19-27	Lode	9	12-27-84	Payne, Anthony
6	T 16 N	R 34 E	Centurion 20-25	Lode	6	11-24-86	do..
8	T 16 N	R 34 E	Toltec 1, 2	Lode	2	07-29-91	Holden, Nick McMahen, B. B.
9	T 16 N	R 34 E	EQF 13, 15, 17 19, 21, 23-30	Lode	13	10-01-87	Sindor, Inc.
16	T 16 N	R 34 E	Aztec	Lode	1	11-05-89	Baughman, Gerald
			Denise	do..	1	do..	do..
			Fallon	do..	1	do..	do..
			Golden Boulder	do..	1	do..	do..
			Limit 1, 2	do..	2	do..	do..
			Lookout 1	do..	1	do..	do..
			Silverbow 3	do..	1	do..	do..
16	T 16 N	R 34 E	Red Baron	Lode	1	07-29-91	Holden, Nick
			Black Hawk	do..	1	do..	McMahen, B. B.
			Inca	do..	1	do..	do..
			Red Baron 1	do..	1	do..	do..
			Peggy	do..	1	do..	do..
			Phantom	do..	1	do..	do..
			Limit 3	do..	1	do..	do..
			Marietta	do..	1	do..	do..
			Crystal	do..	1	do..	do..
			B. L. Conquistador	do..	1	do..	do..
			Aztec 2, 3	do..	2	do..	do..
			Silver Hill	do..	1	do..	do..
			Maya 1, 2	do..	2	do..	do..
			Nancy	do..	1	do..	do..
			Lode King	do..	1	do..	do..
			Hard Rock	do..	1	do..	do..
			Jan	do..	1	do..	do..

Table 1.--Unpatented Mining Claims, Addition to Proposed MLW, NAS Fallon--continued

Section	Township	Range	Claim Name	Type of Claim	Number of claims effected	Date staked	Claim owner
16	T 16 N	R 34 E	Dromedary Hump 1	Lode	1	11-05-89	Baughman, Gerald
			Limit 1, 2	do..	2	do..	do..
21	T 16 N	R 34 E	Sagebrush	Lode	1	07-29-91	Holden, Nick
			Chipmonk	do..	1	07-29-91	McMahen, B. B.
1	T 15 N	R 30 E	Brickyard 2, 3	Placer	2	04-19-79	Hyde, D. and A. Hyde, K.
24	T 15 N	R 30 E	Sand Mountain 1-4	Lode	4	02-21-71	Lemons, F. T.
5	T 17 N	R 27 E	Megan 1-9	Lode	9	11-15-82	Johnson, Joseph L.
10	T 17 N	R 27 E	Wildhorse 8-10	Lode	3	10-24-52	Campbell, S. J. & V. B. Campbell, O. S. Berry, N. and R.
11	T 17 N	R 27 E	Wildhorse 1-5, 8, 11-13	Lode	9	08-28-52	do..
14	T 17 N	R 27 E	Wildhorse 14-18,	Lode	5	10-24-52	do..
15	T 17 N	R 27 E	Wildhorse 19	Lode	1	10-24-52	do..

(Claim location and ownership from BLM records, date February 27, 1992. For more detail concerning claim locations, see appropriate Master Title Plat maps and other records maintained by Churchill County, Nevada)

Table 2.--Patented Mining Claims, Addition to Proposed MLW, NAS Fallon

Section	Township	Range	Claim name	Type of claim	Patent number	MS number	Claim owner
16	T 16 N	R 34 E	Lookout 2	Lode	90643	3383	Roth, Gerald E.
17	T 16 N	R 34 E	Detroit Tiger	do..	47231	2745	Summers, Harry C.
17	T 16 N	R 34 E	Ohio	do..	83149	3206	Scheve, William R.
17	T 16 N	R 34 E	Great Falls	do..	149254	3752	New Era Mining and Development, Inc.

(For more detail concerning claim locations, see appropriate Master Title Plat maps and other records maintained by Churchill County)

A patented mining claim is a claim where both surface and mineral rights have been transferred to the claim owner in a fee-simple title transaction by the Federal government. Certain criteria must be fulfilled prior to the patenting process. The claim must have a valid discovery within the claim boundary. A minimum of $500.00 worth of labor directed toward a valid discovery must have been expended upon the claim. A claim boundary survey by a registered land surveyor describing the claim location by metes and bounds is required. Other criteria and procedures are listed by Maley (Maley, 1978, p. 49, 50).

Prospecting and development that involve large disturbances of land are regulated by the BLM through regulations at Title 43, Code of Federal Regulations (CFR), part 3800. Mine and reclamation plans are reviewed and contain stipulations or conditions to avoid unnecessary or undue degradation of the public land or nonmineral resources.

Leasable minerals are those mineral commodities that may be acquired under the Mineral Leasing Act of 1920, as amended (41 Stat. 437, 30 U.S.C. 185, et seq). Leasable minerals include coal, oil and gas, some other non metallics and geothermal. These minerals are subject to exploration and development under leases, permits, or licenses granted by the Secretary of the Interior. This authority is presently administered by the BLM, and implemented through regulations under Title 43, Code of Federal Regulations (CFR) at parts 3100 (oil and gas), 3400 (coal), and 3500 (solid leasable minerals other than coal and oil shale).1/

Geothermal resources are disposed of by the BLM through permit, lease, and license under the authority of the Geothermal Steam Act of 1970, as amended (84 Stat. 1566; 30 U.S.C. 1001-1025) and implementing regulations of 43 CFR 3200.2/

Salable minerals are common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay. Some of these salables occur within the proposed MLW. Though of relative low unit value, these materials often have high bulk commercial or industrial value and importance when located near markets. The salable minerals assume an even greater importance when other sources become unavailable due to depletion and lack of access. Salables are used chiefly for construction materials and road building.

1/ There are no known mineral commodities within the MLW that fall under the Mineral Leasing Act of 1920.

2/ There is no current exploration for geothermal resources.

Salable minerals are disposed of by contract or permit under the authority of the Materials Act of July 31, 1947, as amended by the Act of July 23, 1955 (69 Stat. 367; 30 U.S.C. 601 et seq). Disposal of salable minerals from public lands administered by the BLM is totally at the discretion of the BLM and implemented under regulations of 43 CFR 3710.

The Department of the Navy is currently studying the possibility for the continuing exploration and mining within the proposed MLW. The proposed MLW and the additions would be classified A, B, C, and D lands dependent upon the perceived health and public safety hazards present. A set of regulations stating operating procedures for mineral entry on the categoried lands will then be formulated.

2.0 Current Mineral-Related Activity

Area 1 (fig. 1) is located at the north end of the Fairview Mining District. This area includes sections 5, 8, 17, T 16 N, R 34 E (unsurveyed). There is no recorded production of metallic ores in recent years. Bureau of Land Management records (table 1) indicate that claim staking has occurred in sections 4, 5, 8, 9, 16, 21, T 16 N, R 34 E (unsurveyed) beginning in 1984 and continuing up through July, 1991. The staking activity was conducted by prospectors as opposed to well-funded exploration companies.

Area 2 (fig. 1) is located at the northeast corner of B-19, north of the Holy Cross Mining District. This area includes the SE 1/4 section 32, S 1/2 of sections 33, 34, 35, T 16 N, R 30 E (unsurveyed). Bureau of Land Management records (table 1) indicates no claim staking has occurred in this area.

Area 3 (fig. 1) is located in sections 22, SW 1/4 23, 26, 27, 33, 34, W 1/2 35, T 17 N, R 28 E and sections 3, 4, T 16 N, R 28 E on the southeast corner of B-16. Bureau of Land Management records indicates that no claim staking activity has occurred in this area.

Area 4 (fig. 1) is located in sections 10, 11, 14, 15, 16, 17, 22, T 17 N, R 27 E (unsurveyed). The Wildhorse claim group covers diatomite exposures in sections 10, 11, 14, 15, 16, T 17 N, R 27 E (unsurveyed) These claims were staked in 1952 (table 1). Recent information received by the BOM indicates that preliminary planning is underway for the extraction of diatomite from the Wildhorse claim group, probably in sections 10, 11, T 17 N, R 27 E (unsurveyed).

The BLM records do not list any claims in sections 17 or 22, T 17 N, R 27 E (unsurveyed). There are numerous prospects in both sections.

3.0 General Geology

3.1 Rock Types

The general geologic relationships in central Churchill County, Nevada, are illustrated by fig. 2. The oldest rocks exposed are Triassic-Jurassic in age (see Geologic Time Scale, table 3). These Triassic-Jurassic rocks are composed of shales, siltstones, carbonates, volcanoclastics, and volcanics. This sequence may represent deposition in a back-arc basin of an island-arc, west of the present day California coast. Also noted are Triassic-Jurassic age diorites, gabbros, and felsites (rhyolite/quartz porphyries).

Cretaceous-age rocks are represented by granitic intrusives, ranging from quartz monzonites to granodiorites in composition. Where these rocks have intruded the Triassic-Jurassic rocks, thermal aureoles have been noted, ranging from hornfelsing to the formation of marble. Some of the intrusives may be quite large, exceeding 100 square miles (Willden and Speed, 1974, p. 18). The Cretaceous intrusives noted in the Churchill County area may be the eastern limit of the Sierra Nevada batholith and represent multi-event intrusion activity covering the period of 200 million years ago to approximately 72 million years ago (Payne, A. L., 1984, private consulting report).

The Tertiary period began about 66 million years ago (table 3). However, Churchill County does not contain Tertiary rocks older than 27 million years. The 40-million-year gap between the end of Cretaceous intrusive activity and the beginning of Tertiary extrusive activity probably represents a prolonged erosional event. Mid-Tertiary rocks are represented by rhyolite flows and intrusives, latite and dacite flow and airfall tuffs, and dacite intrusive bodies. This portion of the Tertiary rock sequence is important as most of the important precious metal deposits occur in these rocks. Younger Tertiary basalts and andesite flows, and tuffaceous sediments cover considerable areas of older rocks (Quade and Tingley, 1987).

Quaternary rocks are represented by sand and gravels, Lake Lahontan sediments, pediment gravels, and dune sands. Quaternary material covers most of the area in Churchill County, filling broad, north-trending, down-faulted basins (Schrader, 1947; Willden and Speed, 1974).

3.2 Structure

Triassic and Jurassic sedimentary and volcanic rocks have been subjected to folding and faulting in at least two and possibly as many as four tectonic events. Axial trends of the folding are northerly and northeasterly. The faulting, both

EXPLANATION, Figure 2

Generalized geologic map,
Central Churchill Co., Nevada

Cenozoic	Quaternary	Includes Lake Lahontan sediments, older alluvium, pediment gravels, and dune sands
	Tertiary	Younger basalts, andesites and dacite flows, some sediments
		Dacite/latite intrusive rocks
		Rhyolite flows and intrusives, some older volcanic rocks
Mesozoic	Cretaceous	Granite rocks
	Jurassic/Triassic	Sedimentary and volcanic rocks, includes some diorites and gabbros

Fault, dashed where projected

Existing range B-17

Proposed MLW area

Addition to proposed MLW area

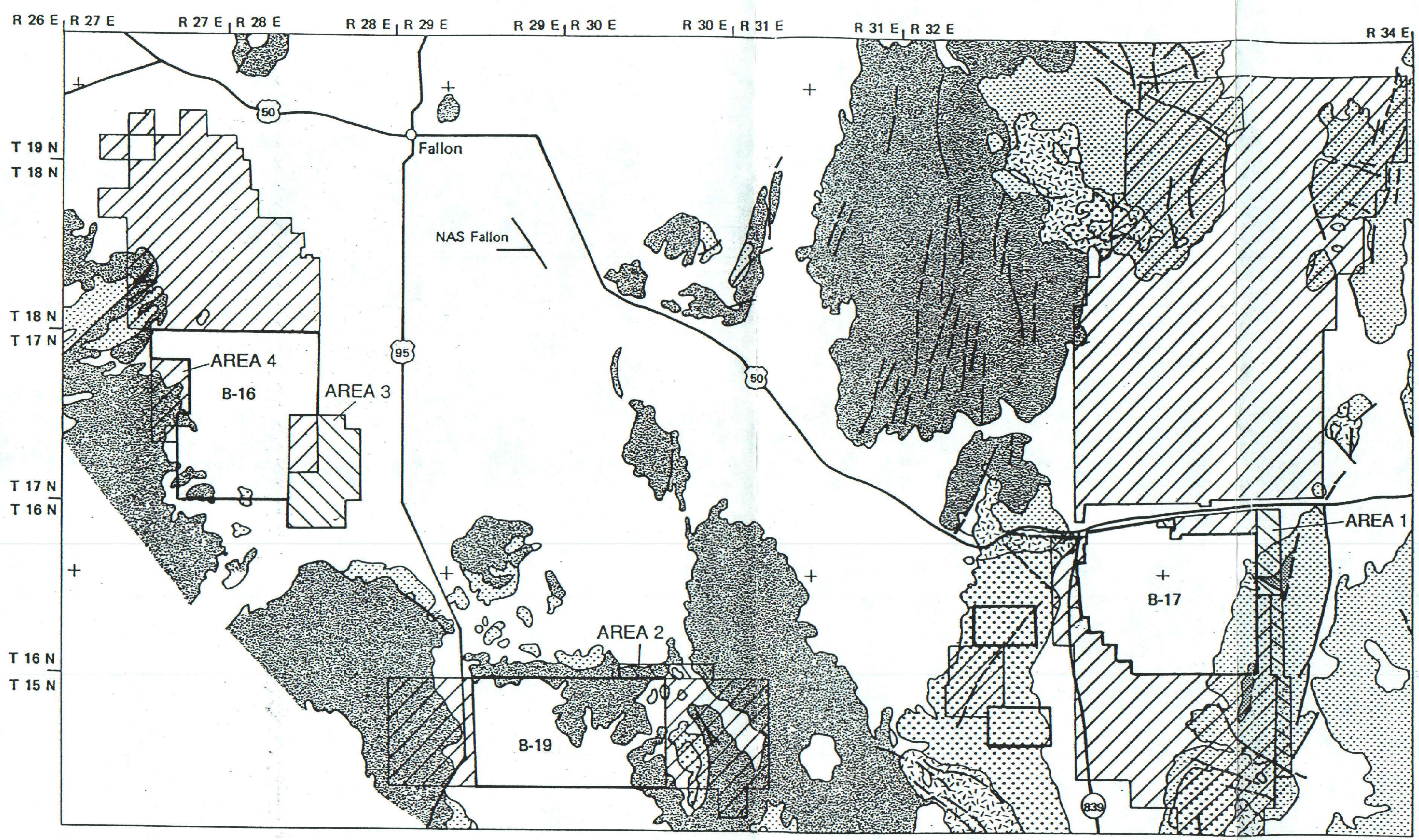

FIGURE 2 - Generalized geologic ma[p]
central Churchill Co., Nevada
with locations of existing ranges,
proposed MLW, and additions to
the proposed MLW

(Modified after Willden and Speed, 1974)
(Thompson and Boleneus, 1991)

Table 3.--Geologic Time Scale
(Modified after Decade of North American Geology,
Geological Society of America, 1983)

Era	Period	Epoch	Age (million years)
Cenozoic	Quaternary	Holocene	0.01
		Pleistocene	1.6
	Tertiary	Pliocene	5.3
		Miocene	23.7
		Oligocene	36.6
		Eocene	57.8
		Paleocene	66.4
Mesozoic	Cretaceous		144.0
	Jurassic		208.0
	Triassic		245.0
Paleozoic	Permian		286.0
	Pennsylvanian		320.0
	Mississipian		360.0
	Devonian		408.0
	Silurian		438.0
	Ordovician		505.0
	Cambrian		570.0
Precambrian	Proterozoic		2500.0
	Archean		3800.0 (?)

high-angle normal and low-angle thrusting, trend mostly northeasterly with minor north-trending strikes. This structural pattern is the result of horizontal shortening (compression) aligned east-west (Willden and Speed, 1974).

The intrusion of the Cretaceous granitic rocks has imparted a structural as well as a thermal fabric on the intruded Triassic and Jurassic rocks. This fabric is aligned with the intrusive contact and is somewhat more random, being east-west as well as northerly.

The horizontal shortening continued into the Cenozoic. Tertiary rocks are folded into broad north- and northeast-trending folds. A minor fold trend striking and plunging southeast has been noted. This minor trend may be due to strike-slip faulting post dating the major fold trend (Willden and Speed, 1974).

In late Tertiary time (Pliocene) and continuing into the present (most recently faulting, 1954), the structural regime changed from compressional to extensional (Willden and Speed, 1974, p. 36). This change marks the onset of Basin and Range faulting. The present mountain ranges and broad valleys were created at this time. Eroding debris from the uplifted mountain ranges continues to fill the basins.

4.0 Area Geology and Field Work Results

4.1 Area 1

Area 1 is located at the north end of the Fairview Mining District at the northeast corner of B-17. Specifically, the area is located in sections 5, 8, portions of sections 16, 17, 21; W 1/2 sections 28 and 33, T 16 N, R 34 E (unsurveyed); W 1/2, W 1/2 sections 4, 9, 16; W 1/2 NW 1/4; NW 1/4, NW 1/4 section 21, T 15 N, R 34 E (unsurveyed) and that portion of sections 2 and 3, T 16 N, R 33 E (unsurveyed) south of highway 50 and north of the existing military reservation.

4.11 Geology

Area 1 is underlain by Tertiary rhyolitic to latitic to dacitic flows and tuffs and andesite flows and agglomerates (fig. 3). This sequence is partially overlain by Quaternary alluvium. West northwest trending faults and veins are noted. The veins are quartz and quartz-calcite fracture filling type with some pyrite/limonite noted. The veins are narrow, rarely exceeding two feet in width. The wall rock is weakly to moderately altered with clay/chlorite occurring in narrow zones parallel to the veins.

EXPLANATION, Figure 3

Original Reservation

Proposed MLW

Addition to MLW

Cenozoic	Quaternary	Qal	Mass wasting products, including some wind blown sand, lake sediments
	Tertiary	Ta	Andesite flow, flow breccias, agglomerates, lacustrine sediments, and air fall tuffs
		Tgr	Granite
		Tri	Rhyolite intrusive
		Tdp	Latite to dacite flows and intrusives
		Trt	Rhyolite to latite, flows, tuffs and welded tuffs
Mesozoic	Triassic/Jurassic	Trjs	Limestone, shale and siltstone and their metamorphic equivalents

Faulting, normal, dashed where projected

Geologic contacts, dashed where projected

Vein

Shaft

Adit

Mine

Prospect pit

Sample site — 91-17-06

Areas discussed in original report

① Centurian claim group

② Dromedary Hump mine

③ Nevada Hills mine

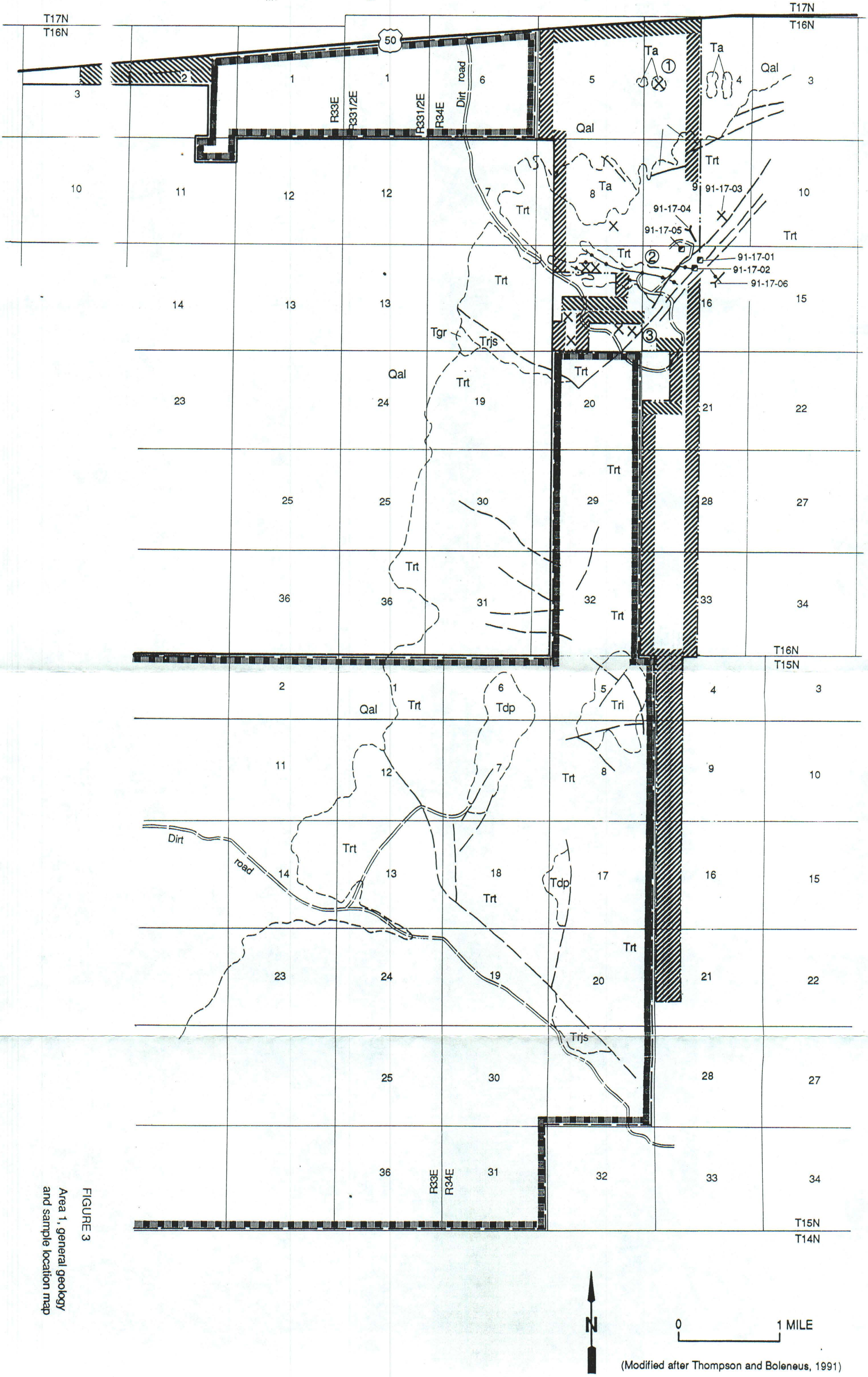

FIGURE 3
Area 1, general geology and sample location map

4.12 Mines and Prospects

In section 5, T 16 N, R 34 E (unsurveyed), most of the bedrock is covered by alluvium. There is one outcrop containing a mineralized vein structure which is the westward continuation of the vein in section 4, T 16 N, R 34 E (unsurveyed). These exposures and prospects are included in the Centurion claim group and were discussed in the previous report (Payne, A. L., 1984, private consulting report).

Section 8, T 16 N, R 34 E (unsurveyed), was field checked, noting geology and mineralization. No samples were taken as the veins were narrow and exposed strike lengths were short. Weak limonite and copper oxide mineralization was noted. No resources were identified and the potential for undiscovered resources (USGS Circular 831, p. 2) in section 8 is thought to be low to moderate (appendix 1).

The prospects and mines in the west half of section 16 and section 17, T 16 N, R 34 E (unsurveyed) were mapped, sampled, and the results were reported in the previous report (Thompson and Boleneus, 1990). The Nevada Hills mill tailings (3) were classified as an identified resource and lie just east of the addition to the proposed MLW in section 16.

The mines and prospects in sections 9 and the east half of section 16, T 16 N, R 34 E (unsurveyed) were mapped and sampled as a part of this report. These workings are immediately east of Area 1 and underlain by rhyolitic to latitic flows and tuffs. A prominent northeast trending fault zone (fig. 3) was noted and mapped.

Sample 91-17-01 (fig. 3 and table 4) was taken on a west northwest, partially exposed, striking vein at the contact between the vein structure and silicified rhyolite volcanics. The vein contains brecciated quartz cemented by quartz and calcite. Also noted was mangano-calcite and siderite (?). Assay results report 0.064 opt gold and 2.52 opt silver (table 4).

Sample number 91-17-02 was taken from a west northwest trending vein between northeast trending faults and hosted by latite tuff (?). The vein contains brecciated quartz cemented by quartz and calcite with iron and manganese oxides. The latite tuffs are weakly to moderately clay altered. The analytical results report 0.235 opt gold and 0.16 opt silver.

Sample numbers 91-17-03, 91-17-04, and 91-17-05 were taken from altered and slightly mineralized rhyolite to latite crystal-lithic tuffs. The tuffs were weakly argillized and silicified. The analytical results report 0.001 opt to 0.010 opt gold and 0.01 opt to 0.33 opt silver.

Table 4.--Analytical Results, Area 1

Sample Number	Sample Description	Sample Location	Au ppm	Au opt[1]	Ag ppm	Ag opt	As ppm	Sb ppm	Bi ppm	Hg ppm	Se ppm	Cd ppm	Ga ppm	Cu ppm	Mo ppm	Pb ppm	Zn ppm
91-17-01	Select dump-calcite, manganocalcite from dump at shaft. Vein ±N. 80 W., 80° SW., contains brecciated quartz cemented with 2 ages(?) of carbonates.	NE 1/4 sec. 16, T. 16 N., R. 34 E.	2.180	0.064	86.253	2.52	7.889	3.989	3.989	<0.100	<1.000	<0.100	<0.500	13.072	8.241	13.264	49.633
91-17-02	Select dump-vein quartz, strongly brecciated, cemented by quartz and calcite. Note iron and manganese oxides.	NW 1/4 sec. 16, T. 16 N. R. 34 E.	8.050	0.235	5.592	0.16	8.94	1.012	0.368	<0.100	<1.000	<0.100	0.932	6.979	1.331	8.501	11.006
91-17-03	Select outcrop-rhyolite lithic tuff, white, bleached, shattered with quartz on fractures; iron oxides noted. Rock is weakly argilized and silicified.	SE 1/4 sec. 9, T. 16 N., R. 34 E.	0.042	0.001	1.018	0.03	6.302	0.448	<0.250	0.152	<1.000	<0.100	<0.500	1.772	1.440	3.957	9.143
91-17-04	Random dump-latite tuff, gray to greenish gray, slightly propyllitized, fractured with iron oxides on fractures. Note spotty silicification.	SW 1/4 sec. 9 T. 16 N., R. 34 E.	0.079	0.002	0.381	0.01	4.737	0.506	0.368	<0.100	<1.000	<1.000	<0.500	2.430	0.640	8.501	13.013
91-17-05	Random dump-latite(?) tuff, gray, white, fractured and broken, weakly argillized.	NW 1/4 sec 16 T. 16 N., R. 34 E.	0.342	0.010	11.153	0.33	38.191	2.861	2.761	0.456	<1.000	<0.100	<0.500	5.439	17.631	30.999	8.257
91-17-06	Select dump-vein material, quartz and calcite white, fractured, iron oxides on fractures.	NE 1/4 sec 16 T. 16 N., R. 34 E.	2.210	0.064	63.096	1.84	2.867	0.973	<0.250	0.186	<1.000	<0.100	<0.500	6.501	0.769	4.690	3.390

[1]Conversion factor, ppm to opt: (ppm) x (0.0292).

Sample number 91-17-06, quartz calcite vein material, was taken from the dump on a shaft and adit. The vein is hosted by latite tuffs. The vein material is fractured and brecciated, and mineralized with iron oxides. The latite tuff is altered with clay/chlorite/celadonite noted. The sample was composed of mineralized quartz and calcite. The analytical results report 0.064 opt gold and 1.84 opt silver.

4.13 Resource Potential

The area characterized by samples 91-17-01, 91-17-02, and 91-17-06 represents a structurally prepared zone containing multiple west northwest trending vein structures with veins up to 4.0 feet thick. The potential for additional vein mineralization for gold and silver is thought to be moderate to high. Further work will be required to delineate resources.

The area characterized by samples 91-17-03, 91-17-04, and 91-17-05 is only weakly mineralized and altered. No resources were identified and the potential for vein mineralization with high enough grades to support small underground mining is thought to be low.

4.2 Area 2

Area 2 is located north of the Holy Cross Mining District and is a proposed addition to B-19 (fig. 4).

4.21 Geology

The geology of this area consists of late Tertiary basalt flows and eolian sands. Gravels from mass wasting occur along Diamond Field Jack Wash, a northwest trending feature.

4.22 Mines and Prospects

Field reconnaissance indicated no claim staking in the basalt and sand covered areas. There were some sloughed pits along and adjacent to Diamond Field Jack Wash indicative of past placer activity. A check of the BLM claim records indicated no recent activity.

4.23 Resource Potential

Field work did not uncover any evidence of mineralization. No structures, alteration, or other evidence was noted. The gravels along Diamond Field Jack Wash were also lacking evidence of mineral content. No samples were taken in this area and no resources were identified. The resource potential is considered to be quite low.

EXPLANATION, Figure 4

Original Reservation	———————
Proposed MLW	▬▬▬▬▬▬▬
Addition to proposed MLW	\\\\\\\\\\\\\\\\

Cenozoic	Quaternary	Qal	Gravels, talus, and eolian sand
	Tertiary	Tba	Basalt flows
		Tr	Rhyolite to latite welded tuffs and flows, includes rhyolite flow domes (Tri)
Mesozoic	Cretaceous	Kgr	Granodiorite, medium crystalline to slightly porphyritic

Fault, normal, dashed where projected	———— — —
Geologic contact, dashed where projected	———— - - -
Mine	⚒
Prospect pit	X

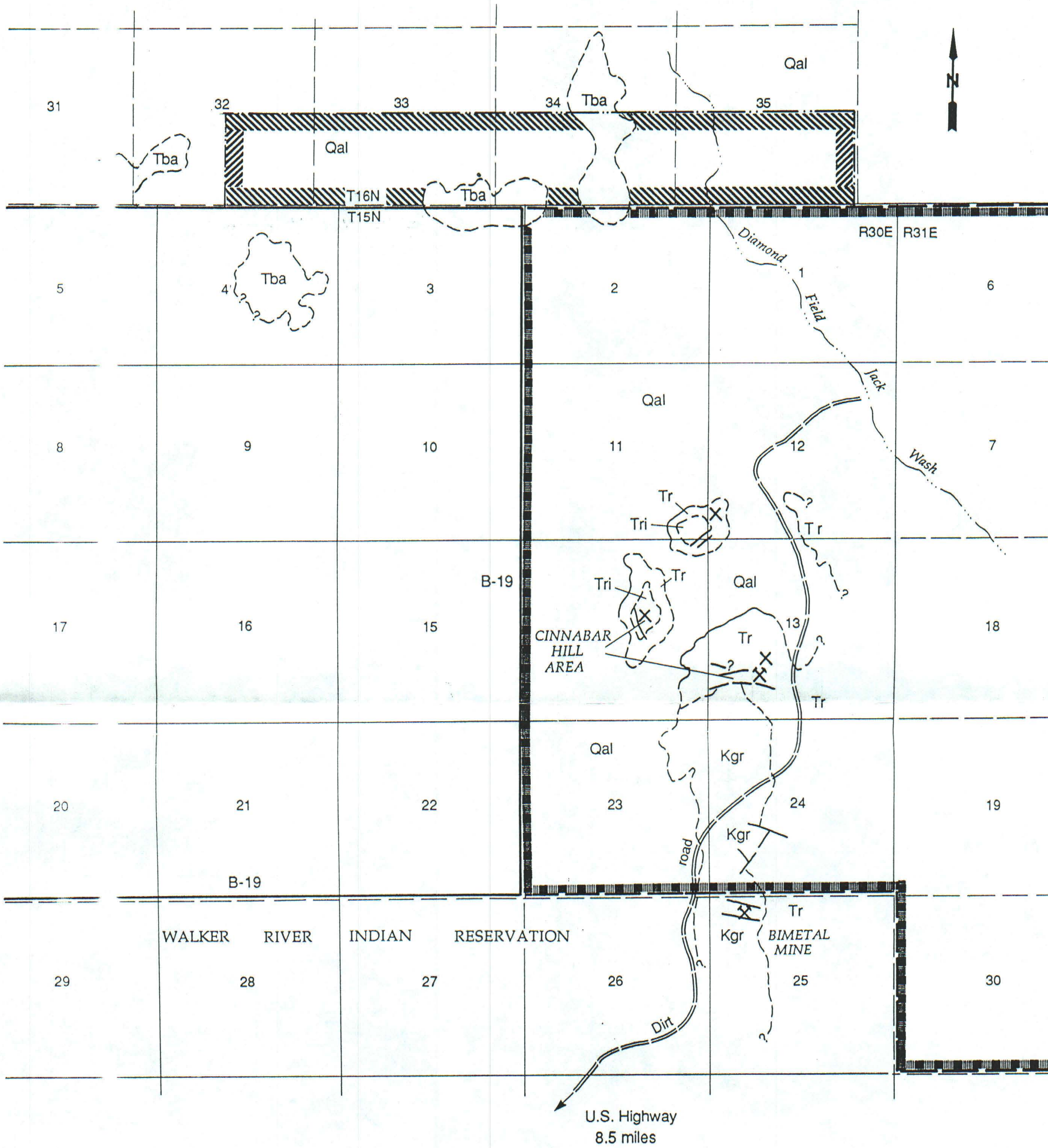

FIGURE 4
Area 2, general geology and location map
Scale: 1"=3000'
0 3000 FEET
(Thompson and Boleneus, 1991)

4.3 Area 3

Area 3 is located at the southeast corner of B-16 as an addition to the proposed MLW (fig. 5). This area does not occur within a recognized mining district.

4.31 Geology

The geology of Area 3 consists of late Tertiary basalt flows and rhyolite tuffs covered by Pleistocene lake sediments, gravels and eolian sands.

4.32 Mines and Prospects

Field reconnaissance indicated no evidence of claim staking in this area. There was only minimal evidence of alteration in the rhyolite flows possibly reflecting a cooling unit sequence.

4.33 Resource potential

Eolian sands and lakebed sediments were observed. No samples were taken and no resources identified. The resource potential of this area is considered quite low.

4.4 Area 4

Area 4 (fig. 6) lies within sections 10, 11, 14, 15, 16, 17, and 22, T 17 N, R 27 E (unsurveyed).

4.41 Geology

The area is underlain by the Eagles House Formation, consisting of rhyolite to dacite flows, thick and massive in the lower part of the unit, and thin, with locally perlitic and pumiceous members in the upper part of the unit. Locally, this formation grades laterally into the overlying Truckee Formation (Morrison, 1964, p. 10-12). The Truckee Formation consists of silic to mafic tuffs, tuffaceous sandstones and gravels, and limestone. The Truckee Formation includes the diatomite in this area. Overlying the Truckee Formation is a young basalt which caps many of the low hills. The youngest unit is the alluvium occurring mostly in the flats north and south of Area 4.

4.42 Mines and Prospects

Diatomite (fig. 6) is exposed in sections 11, 14, 15, 16, and 17, T 17 N, R 27 E (unsurveyed). The Wildhorse claim group covers the exposure in sections 11, 14, 15, and 16. The exposure in section 17 is outside of the proposed MLW and does

EXPLANATION, Figure 5

Original Reservation

Proposed MLW

Addition to proposed MLW

Cenozoic	Quaternary	Qya	Lake Lahontan deposits, playa deposits, and young fan gravels
	Tertiary	Tba	Basalt
		Tr	Rhyolite, flows, tuffs, and welded tuffs

Geologic contacts, dashed where projected

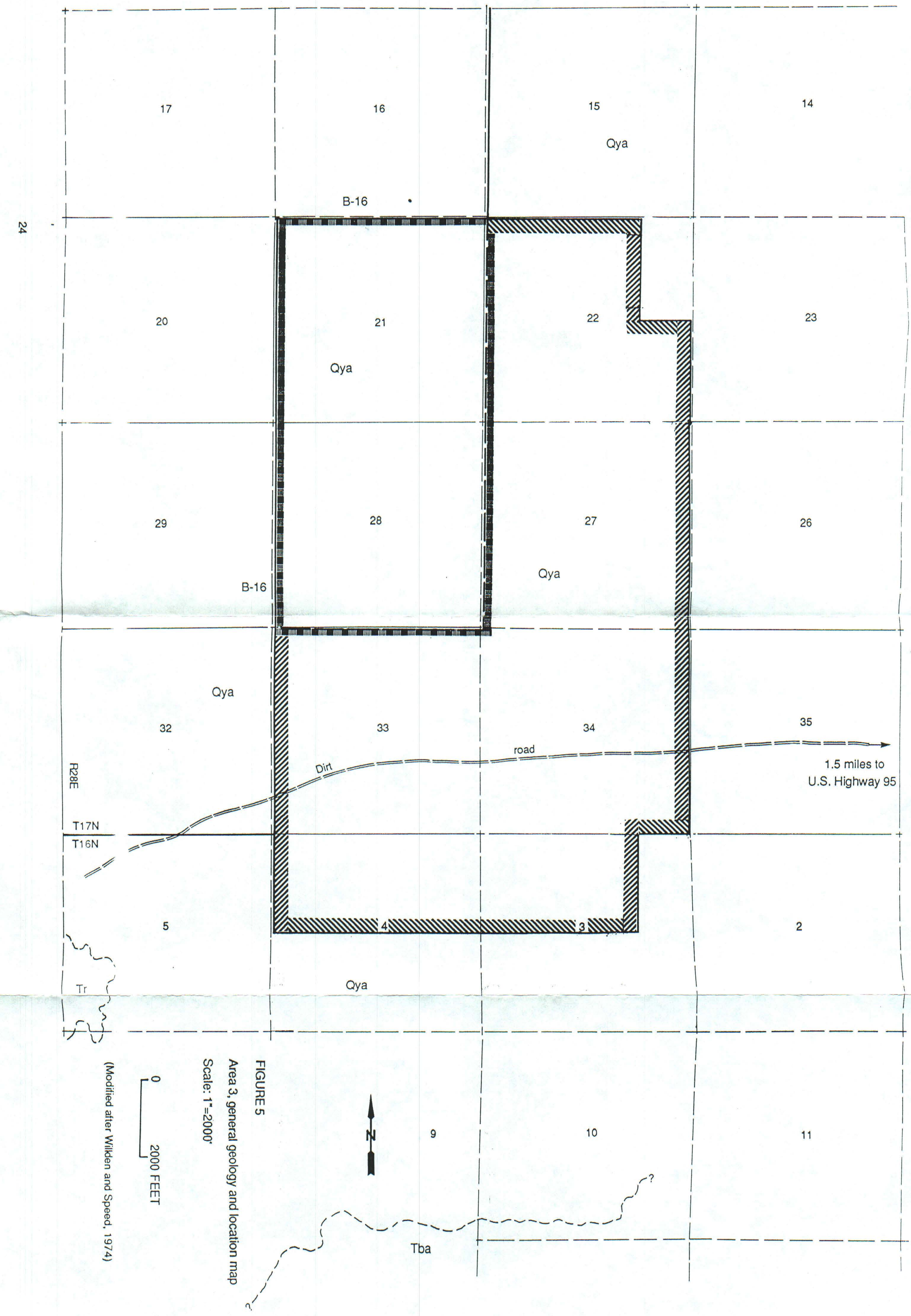

FIGURE 5
Area 3, general geology and location map
Scale: 1"=2000'

(Modified after Willden and Speed, 1974)

EXPLANATION, Figure 6

	Original Reservation		
	Proposed MLW		
Cenozoic	Recent	Qal	Mass wasting material including Lake Lahonton sediments
	Tertiary	Tba	Basalt
		Ttf	Truckee Formation, silic to mafic tuffs, tuffaceous sandstone and gravel, diatomite, and limestone
		Ttd	Truckee Formation. diatomite member
		Tehf	Eagles House Formation, rhyolite to dacitic flows, thick and massive in lower part, thin and locally perlitic and pumiceous in the uppermost parts, locally grades laterally into lower part of the Truckee Formation
		Tra	Eagles House Formation, rhyolite ash member, bleached white

Geologic contact

Dip and strike — 30°

Shaft

Adit

Open cut

Sample site — 91-16-07

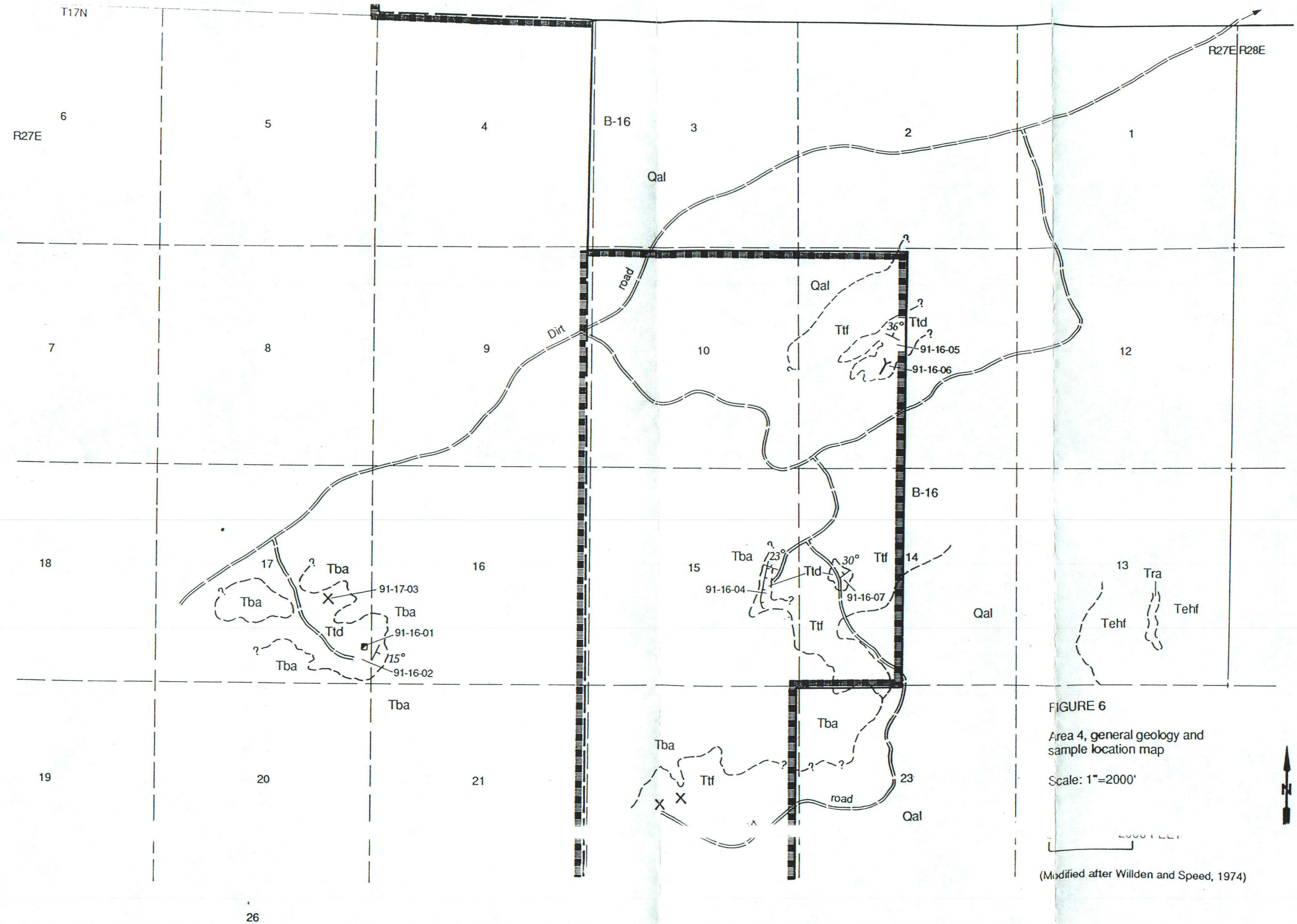

FIGURE 6

Area 4, general geology and sample location map

Scale: 1"=2000'

(Modified after Willden and Speed, 1974) not appear to be under claim. Samples 91-16-01, 91-16-02, and 91-16-03 (fig. 6) were taken from various prospect pits. The samples consisted of both blocky and pulverant diatomite occurring in thin to thick beds dipping 10 to 17 degrees, south 60 to 70 degrees east. The color ranged from a bright shiny white to greenish gray to brownish gray. The color variation represents organic, carbonate, clay, and metallic contamination. The field observation of possible contaminants is confirmed by the chemical analysis (table 5). Samples 91-16-02 and 91-16-03 are both high in alumina (Al_2O_3) indicating clay. Sample 91-16-03 is also high in calcium oxide (CaO), indicating limestone, and iron oxide (Fe_2O_3). Sample 91-16-03 is also high in potassium oxide (K_2O) indicating contamination by volcanic ash. The outcrop area is dipping beneath the younger basalt which represents about 100 feet of cover.

Samples 91-16-04 through-07 were taken within the Wildhorse claim group. Sample 91-16-04 was taken from a diatomite exposure on a hillside. The sample consisted of blocky and pulverant diatomite in thin to thick beds dipping 23° northeasterly. Intercalated beds of basaltic sand and clay were observed. The chemical analysis (table 5) verifies the field observations.

Samples 91-16-05 and 91-16-06 were taken from a large exposure in section 11. The diatomite ranges in color from white to grayish white to brownish white. The diatomite dips 36 degrees northeasterly and is thin to medium bedded and intercalated with sand/silt and some carbonate.

Sample 91-16-07 was taken from a small exposure in section 14. The diatomite is gray white to gray to brownish white and is intercalated with silt/carbonate/volcanic ash. The diatomite beds are thin laminated to medium bedded and dip 30 degrees to the northwest. The chemical analysis (table 5) tends to confirm the observed contaminants.

Table 6 illustrates the analytical data from the Wildhorse claim owners. This data compares quite well with analytical data from BOM sampling (table 5). There appears to be minor contamination from clay and volcanic ash.

The prospects in section 22, T 17 N, R 27 E (unsurveyed) were examined, as probable Truckee Formation occurs in this area. The field examination revealed the presence of barite, gypsum, and celestite (?), These mineral occurrences did not appear to be thick enough or continuous enough to constitute a resource. No samples were taken and no resources were identified.

4.43 Resource Potential

[illegible] are unicellular, aquatic plants related to the algae (Kady, 1975, p. 605). A unique feature of diatoms is the mesh-like openings in their skeletons. These openings,

Table 5.--Analytical Results. Area 4

Sample number	Sample description	Sample location	Sample weight grams	200 Mesh % pass	200 Mesh % retained	Bulk density gms/cm³	Bulk density lbs/ft³	Wet density gms/cm³	Wet density lbs/ft³	Loss on ignition %	SiO_2 %	Al_2O_3 %	K_2O %	CaO %	Na_2O %	MgO %	Fe_2O_3 %	TiO_2 %	PO_4 %
91-16-01	Dump-diatomite, white to light greenish gray to light brownish gray, some silt and shale.	SE 1/4 sec 17 T. 17 N., R. 27 E.	1,000	35	65	1.71	107.00	1.88	117.00	2.3	91.10	5.3	0.43	0.07	0.04	0.20	0.21	0.60	<0.03
91-16-02	Outcrop channel-diatomite white to greenish gray to brownish gray, shiny to bright, with variable clay and volcanics.	SE 1/4 sec 17, T. 17 N., R. 27 E.	1,000	37	63	0.96	60.00	1.38	86.00	5.4	74.00	16.8	0.55	0.70	0.50	0.10	0.26	1.30	0.03
91-16-03	Outcrop channel-diatomite white to to brownish white to slightly greenish white shiny to bright, with some clay and volcanic ash noted.	SE 1/4 sec 17 T. 17 N., R. 27 E.	1,000	33	67	1.18	74.00	1.52	95.00	5.3	67.30	16.6	3.60	2.00	0.61	0.50	2.30	0.29	<0.03
91-16-04	Outcrop channel-diatomite white to gray to brownish gray green, not shiny, with intercalated basalt sand and carbonates.	SE 1/4 sec 15 T. 17 N., R. 27 E.	1,000	27	73	0.81	51.00	1.20	75.00	6.3	76.30	4.3	0.87	8.00	0.80	0.38	2.00	0.18	<0.03
91-16-05	Outcrop channel-diatomite white to greenish white to brownish white, bright to shiny, intercalated with opalite(?), clay, volcanic ash(?).	NW 1/4 sec 15 T. 17 N., R. 27 E.	1,000	15	85	0.76	47.00	1.26	79.00	4.5	82.10	6.9	1.0	1.10	1.10	0.49	2.20	0.48	<0.03
91-16-06	Outcrop channel-diatomite, white to grayish white, with intercalated clay and volcanic ash	SW 1/4 sec 11 T. 17 N., R. 27 E.	1,000	21	79	0.71	44.00	1.08	67.00	4.3	85.00	5.3	0.88	1.40	0.97	0.48	1.80	0.17	<0.03
91-16-07	Outcrop channel-diatomite gray to grayish white to brownish white, not bright, with clay and volcanic ash intercalated.	SW 1/4 sec 14 T. 17 N., R. 27 E.	1,000	34	66	1.15	72.00	1.53	96.00	6.5	67.90	12.20	3.10	5.40	0.61	0.70	2.40	0.22	0.03

Table 6.--Resource Estimate, Area 4

Resource Area	Length (ft)	Width (ft)	Area (ft^2)	Thickness (ft)	Volume (ft^3)	Density (lbs/ft^3)	Tonnage Factor (ft^3/ton)	Resource (tons)
Section 17, T [illegible] N, R 34 E (samples 91-1[illegible] 01, 02, 03)	2500	1500	3,750,000	25	93,750,000	80	25	3,750,000
Section 15, T [illegible] N, R 34 E (samples 91-1[illegible] 04)	800	500	400,000	30	12,000,000	51	39	307,700
Section 11, T [illegible] N, R 34 E (samples 91-1[illegible] 05, 06)	2,500	1,800	4,500,000	35	157,500,000	45.5	44	3,580,000
Section 14, T [illegible] N, R 34 E (sample 91-16[illegible] 07)	900	700	630,000	20	12,600,000	72	28	450,000

because of their size and number, can be utilized as filter-medium for fluid purification. Other uses include fillers and extenders in paints, rubber, and plastics, thermal insulating material, catalyst carriers, anti-caking agents and polishes (Kady, 1975, p. 605).

Chemical analysis of preprocessed diatomite is necessary because certain elements increase processing costs and/or limit potential applications. The analysis can also be used to identify certain contaminants.

The silica content (SiO_2) should range from about 78% to about 94%. Other elements, such as alumina (Al_2O_3), lime (CaO), magnesia (MgO), potassium (K_2O) and sodium (Na_2O) are incorporated in the diatom skeleton but at relatively low levels (Kady, 1975, p. 605-607).

The element iron (Fe_2O_3) above about 2% can cause discoloration during processing. The element titanium (TiO_2) above about 0.5% also causes discoloration and may increase brittleness. The element phosphorus; expressed as the phosphate radical P_2O_5 or PO_4, may effect the pH of the product (Kady, 1975, pp. 620-622).

Table 7 illustrates the resource tonnages of diatomite available in Area 4. These resource tonnages are calculated on limited field observations and should be considered a minimum as thickness measurements were taken from incomplete outcrop exposures and not from drill hole information. At no observation point were both the top and bottom of the diatomite member exposed.

Phone conversations with the Wildhorse claim leasors have indicated that preliminary planning for extraction and marketing of diatomite has started. It is expected that production will begin in the section 11 resource (fig. 6). At this point in time, no discussions between the leasors and BLM concerning the necessary permits has taken place. The permitting sequence is generally a 12 to 18 month process.

5.0 Summary

In area 1 (fig. 3), samples 91-17-01, 91-17-02, and 91-17-06 (table 4) indicate areas of inferred resources for small tonnage underground production of precious metals. These sample locations are outside but immediately adjacent to the addition to the proposed MLW.

In Area 4 (fig. 6), BOM sample results indicate diatomite resources suitable for marketing after processing occur in sections 11, 14, 15, 16, and 17, T 17 N, R 27 E (unsurveyed). A resource tonnage (table 7) was calculated which indicates at

Table 7.–Analytical results, from owner, Wildhorse claim group

Moisture (dry basis)	3.2%
Loss on ignition	5.2%
Bulk density - gms/cm^3	0.74 gms/cm^3
Al_2O_3	4.70%
CaO	0.85%
Fe_2O_3	1.50%
MgO	0.38%
PO_4	- 1/
K_2O	0.45%
SiO_2	84.70%
Na_2O	2.00%
TiO_2	- 1/

1/ Not analyzed

least a 20 year production capability at the rate of 40,000 tons per year exists at these locations. Further testing will probably be required to demonstrate continuity and grade of product to enhance market viability.

The diatomite resource, depending on the final product, will have an estimated value ranging from $100 to $350 per ton. The gross value of an annual production rate of 40,000 tons will range from $4 million to $14 million per year.

The BOM is unable, at this time, to complete a socioeconomic study on the diatomite resource for the following reasons: 1) the BOM does not know what type or grade of diatomite products will be produced as grade determines price (Kady, 1975); 2) the BOM does not know which market the owners will enter as market will determine production level and therefore equipment costs, both mining and processing (Kady, 1975).

6.0 References

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APPENDIX 1

DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Guide to Preparation of Mineral Survey Reports on Public Lands

Compiled by

Gus H. Goudarzi[1]

Open-File Report 84-787

1984

[1]Reston, Virginia

CONTENTS

ILLUSTRATIONS

Identified resources

The terminology for identified resources summarized here is taken from USGS Circular 831.

Mineral resource--A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

Identified resource--A resource whose location, grade, quality, and quantity are known or can be estimated from specific geologic evidence. Identified resources include economic, marginally economic, and subeconomic components.

Reserves--That part of an identified resource that meets specified minimum physical and chemical criteria related to current mining and production practices and can be economically extracted or produced at the time of determination. Reserves include only recoverable materials.

Mineral resource potential

The definition of mineral resource potential and of the several levels of resource potential given here essentially follows the suggestions of Taylor and Steven (1983).

Mineral resource potential--The likelihood for the occurrence of undiscovered mineral resources in a defined area; it is closely related to mineral resource favorability. Mineral resource potential is preferred in the description of an area; favorability is best applied to a specific rock mass (or type) or geologic environment. Mineral resource potential (likelihood of occurrence) cannot be classified according to the McKelvey diagram (McKelvey, 1972). The levels of resource potential that can be specified include HIGH, MODERATE, LOW, NO, and UNKNOWN.

In general, terrane can be classed as either favorable or unfavorable for the occurrence of resources based on geologic environments defined in terms of geological, geochemical, and geophysical characteristics. Geologic terranes considered unfavorable are generally classed as having LOW potential, recognizing that most of these areas still have some finite, albeit small, likelihood of containing mineral resources. Areas with terrane deemed favorable can be subdivided into areas of MODERATE potential and HIGH potential; the distinction is based on the nature of the evidence favoring the occurrence of undiscovered resources of a particular commodity or group of commodities. The division between LOW and MODERATE resource potential is of primary importance for land-use decisions because it separates favorable from unfavorable ground. The division between MODERATE and HIGH is no less important to those who explore for minerals.

LOW mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics define a geologic environment in which the existence of resources is unlikely. This broad category includes areas with dispersed but insignificantly mineralized rock as well as areas with few or no indications of having been mineralized. Areas of low resource potential with indications of mineralization such as ill-defined geochemical anomalies or widely dispersed, low grade veins can be separated from areas of low potential lacking such indications by using outlines or patterns on maps. Use of the low potential category requires specific positive knowledge; it should not be used as a catch-all category for areas lacking adequate data.

MODERATE mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a reasonable likelihood of resource accumulation, where an application of mineral deposit models indicates favorable ground for the specified type(s) of deposits.

HIGH mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics indicate a geologic environment favorable for resource occurrence, where interpretations of data indicate a high degree of likelihood for resource accumulation, where data support mineral deposit models indicating presence of resources, and where evidence indicates that mineral concentration has taken place. Assignment of high resource potential to an area requires some positive knowledge that mineral forming processes have been active in at least part of the area. Resources or deposits need not be identified for an area to be assigned high resource potential.

UNKNOWN mineral resource potential is assigned where information is inadequate to assign low, moderate, or high levels of resource potential to the area. For mineral resource surveys on public lands, this category will generally be used only for areas with thick alluvium or other covering rock unit and where geophysical and geochemical data are not adequate to determine the level of resource potential.

NO mineral resource potential is a category that should be reserved for a specific type of resource in a well-defined area. It is appropriate to say that there is no oil potential in an area where the only rocks present are unfractured Precambrian granite, but the term LOW is appropriate if there is a slightest possibility for resources. The rating of NO resource potential should not be used as the rating for all types of commodities in any area.

Certainty

A dual classification scheme using mineral resource potential and certainty has been adopted for use in mineral survey reports on public lands. The general format for the system using two ratings was suggested by Voelker and others (1979). One rating (the level of mineral resource potential) expresses the favorability of the area for a given resource, and a second rating (the level of certainty) indicates the confidence with which the rating of resource potential was assigned. The certainty rating should reflect (1) the adequacy of the geologic, geochemical, geophysical, and resource data base available at the time of evaluation, and (2) the [illegible] deposit model used as the basis for each assessment. Generally, the attributes of a mineral deposit type are determined first, the requirements for high, moderate, and low resource potential developed next, and the nature and amount of data required for the various levels of certainty determined last. After setting these criteria, comparison with data from the area being assessed leads to assignment of the level of resource potential and the level of certainty.

Four levels of certainty are designated:

- Level A. Available information is not adequate for determination of the level of mineral resource potential.
- Level B. Available information suggests the level of mineral resource potential.
- Level C. Available information gives a good indication of the level of mineral resource potential.
- Level D. Available information clearly defines the level of mineral resource potential.

Logic dictates that Level A (inadequate data) must be coupled with Unknown resource potential. Usually, level A is used only if the unit that might contain the resource is covered, and where geologic projection (as for a buried coal bed), and geophysical and geochemical data fail to provide indication of the likelihood of resource occurrence.

The chief difficulties in assigning the certainty rating for a deposit type are encountered in selecting points on the continuum of information that separate levels B, C, and D. For Level B, available data should suggest the level of resource potential; the general geologic environment must be known but some key evidence about rock units, structure, or applicable ore models might be lacking, and the past activity of resource-forming processes in the area would not be determinable. For example, in the case of a magnetite-skarn, level B might mean that although an intrusive mass of considerable size was identified, the presence of beds favorable for replacement could not be predicted geologically, and no aeromagnetic survey was available. For Level C, available data should give a good indication of the level of resource potential. For the magnetite-skarn, above, level C might indicate that the composition of the intrusive mass could be determined and was regarded as a favorable source of metals, that beds favorable for replacement could be geologically projected as in contact with the mass, but that no aeromagnetic survey was available, and that the activity of a resource-forming process could not be determined. For Level D, the available data must clearly define the level of resource potential. For the magnetite-skarn, level D might indicate that a highly magnetic zone was detected by an aeromagnetic survey, and that it surrounds the margins of a granodiorite stock where limestone beds were projected as in contact with the intrusion. In this example, even though magnetite might not have been seen, the likelihood of deposit occurrence can be regarded as high, with a high degree of certainty; further, the deposit model indicates that resources are likely in this environment. Generally, Level D requires knowledge that processes capable of forming resources have been active in at least a part of an area classified as of high resource potential. Assignment of a High resource potential rating is usually accompanied by a C or D level of certainty [illegible] where designation of a B level might be appropriate, based on new and evolving (wildcat) concepts and ideas. At the other end of the scale, at least level D is required if a rating of No potential is assigned to an area for a specific commodity; the "No" rating requires the same degree of certainty that is required for identified resources, and thus is rarely used.

The resource potential of a defined area for a selected commodity (or group of commodities) in a specific deposit type should be designated by the dual letter scheme shown on the mineral resource potential/certainty diagram (fig. 1). This scheme should be used throughout the mineral resource report to provide consistency and ensure that each part, especially the mineral resource potential map, will make sense alone. For example, H/C will always refer to an area that has high resource potential with good, but not fully adequate supporting data, and M/B will always refer to an area that has moderate resource potential but minimal supporting data.