

PUBLIC DATA FILE 87-9

SURVEY OF MINERALS--RELATED INFORMATION FOR SELECTED MINERAL LICKS,  
MATANUSKA VALLEY MOOSE RANGE, ALASKA

by

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Introduction

On April 2, 1987, the Division of Land and Water Management (DLWM) Manager of the Matanuska Valley Moose Range Project requested that Division of Geological and Geophysical Surveys (DGGs) provide site-specific analyses of mineral potential, if available, or other minerals-related information for mineral licks identified by the State of Alaska Department of Fish and Game (ADFG). This need for information is identified in the implementation instructions for the Department of Natural Resources (DNR) Matanuska Valley Moose Range Management Plan in order to decide if existing temporary (1-year) mineral closures around mineral licks should become permanent. These decisions will be negotiated between DNR and ADFG this summer (1987) after pertinent biological and geological data are compiled and analyzed.

Geological Conditions and Claim/Lease Status

The following brief summaries of known geologic conditions in the vicinities of the ten confirmed and five unconfirmed mineral licks are taken primarily from technical reports published by the U.S. Geological Survey, U.S. Bureau of Mines, DGGs, and other sources and from generally uncirculated DGGs technical reports (Public Data File reports and Prospect Examination reports). They are very generalized and should not be considered to be site-specific for a given mineral lick unless specifically stated. Information on past and current activities by

the minerals industry and claim/lease status as of 1986 was collected from the DNR Division of Mining (DOM) Kardex MINFILE system, which is maintained in the DOM Fairbanks office, unless otherwise stated.

Mineral Lick #4 (confirmed)

This site (sheet 1) is located along the main strand of the Castle Mountain fault and the volcanic bedrock (Talkeetna Formation)(Magoon and others, 1976) may contain significant local mineralization, e.g., copper, nickel, gold. Two nearby blocks of eight active placer-gold claims on Puddingstone Creek (ADL327374 through ADL327381)(Kardex File 85-304), which enters the Chickaloon River valley just north of Mineral Lick #4 (sheet 1), verify the presence of significant precious-metal mineralization in this area. Also, a placer-gold mine (Kardex File 85-380) was last active in 1973 on the un-named tributary that enters the Chickaloon River valley just south of Mineral Lick #4 (sheet 1). Continued development of the Puddingstone Creek placer mine is likely and, with the recent increase in the price of gold, renewed interest in the southern claim block (Kardex File 85-380) is not unrealistic.

Mineral Lick #6 (confirmed)

This site (sheet 2) is apparently located on glacial and colluvial deposits at the base of a rubble slope derived from potentially metal-liferous granitic intrusive bedrock (granodiorite, quartz diorite) (McGee and Henning, 1977). The closest minerals-related interest is an inactive (1980) placer-gold claim (Kardex File 85-439) that is centered 0.9 mile south of Mineral Lick #6 in the braided floodplain of Kings River (sheet 2). Two large masses of pyrrhotite crop out at higher elevations 6 to 7 miles northeast of Mineral Lick #6 (sheet 1), but assays of samples taken there by Jasper and Mihelich (1961, p. 7) yielded no detectible copper, nickel, gold, or silver and neither deposit has been formally staked for its metal values. Considerable interest

has been focused in the past on high-quality limestone beds that crop out up the East Fork Kings River between 4 and 11.5 miles northeast of Mineral Lick #6 (Jasper and Mihelich, 1961; McGee and Henning, 1977) (Kardex File 85-270)(sheets 1 and 2). Large tonnages of low-magnesian limestone occur in the upper drainages of both Kings River and Chickaloon River and may prove attractive to private concerns looking for limestone that is chemically suitable for making cement or for agricultural purposes. The Kardex File records the last formal mining activity on the limestone beds 4 to 6 miles northeast of Mineral Lick #6 in 1975.

Periodically we are asked about low-magnesian limestones in Alaska because of the high cost of shipping cement from Seattle to Alaska. My discussions with DGGs geologists indicate that a Native corporation headquartered in south-central Alaska is very interested in developing the Kings River limestones. If this development should occur, the most obvious access to the mine sites is up the broad floor of Kings River valley (sheets 1 and 2).

It is realistic to assume that the recent rise in the price of gold will encourage exploration for metallic deposits in upper Kings River valley.

#### Mineral Lick #7 (confirmed)

This site appears to be located at the head of a small alluvial fan related to a large landslide on the floor of Kings River valley (sheet 2). The fan is underlain by an unknown thickness of stream alluvium and glacial deposits that bury granitic bedrock (granodiorite, quartz diorite)(McGee and Henning, 1977). The technical literature cites a surface copper show (Kardex File 85-182) in bedrock 1.3 mile south-south-west of Mineral Lick #7 (sheet 2). Two limestone beds 1.4 and 2.1 miles southeast of the mineral lick, respectively, were last actively investigated by mineral companies in 1975 (Kardex File 85-270)(sheet 2).

Minerals-related issues for Mineral Lick #7 are very similar to the

issues relevant to Mineral Lick #6.

Mineral Lick #8 (confirmed)

Bedrock at this lick (sheet 2) is the coal-bearing Chickaloon Formation (Barnes, 1962). The lick is close to the trail/road that connects the Castle Mountain Coal Mine (Plangraphics, 1983, p. 112) to the Chickaloon/Drill Lake road (sheet 2). Castle Mountain Coal Mine is situated 0.9 mile west-north-west of the lick (sheet 2). Coal was mined there by open-pit methods in 1958 and 1960, and the coal leases are still active (ADL33978 issued August 1, 1958, and ADL53509 issued March 25, 1968). Two pits produced 18,800 metric tons of high-quality bituminous and anthracite coals from two (6- and 8-foot-thick) beds (Merritt and Belowich, 1984; Merritt, 1985a, b). The coals have moderate ash contents for commercial use, low to medium volatile contents, low sulfur contents, and heating values ranging from 12,500 to 15,300 BTU/lb. Coal is still stockpiled at the mine site. Mining stopped because the producing beds pinched out, were offset by faults and could not be relocated, or were crosscut by intruding igneous rock (diabase) that has locally upgraded the coals to coking quality. According to Merritt and Belowich (1984, appendix B), only 2 to 3 feet of the lower coal seam remain in the Castle Mountain Coal Mine; the upper coal seam and 4 to 6 feet of the lower seam were mined completely.

About 2 miles west of Mineral Lick #8 is the Kings River Coal Prospect (Plangraphics, 1983, p. 112)(sheet 2), where four bituminous coal beds with a maximum thickness of 4 feet and an aggregate thickness of 8 feet are sandwiched in outcrop between sandstones and shales of the Chickaloon Formation (Merritt and Belowich, 1984). These high-quality coals have moderate to high ash contents, low to medium volatile contents, low sulfur contents, and heating values ranging from 8,500 to 14,800 BTU/lb. A check with the DOM Coal Leasing Section indicates no present activity at this prospect.

A placer-gold claim that was last active in 1960 is located on upper

California Creek 0.6 mile east-north-east of Mineral Lick #8 (Kardex File 85-269)(sheet 2). The source of the gold there is undoubtedly not the local bedrock, which is the Chickaloon Formation (Barnes, 1962), but is probably glaciofluvial gravels in a nearby former sideglacial meltwater channel. A lode mineral claim without mineral designation (Kardex File 85-384) is situated 2.8 miles west-north-west of Mineral Lick #8 (sheet 2). The presence of Matanuska Formation there (Barnes, 1962) makes the validity of a lode claim at that location suspect and it has not been active since 1978.

About 1.2 mile south-south-east of Mineral Lick #8 is the site of a dry test well (Peterson Oil Association Chickaloon No. 1)(Kardex File 85-228) that was drilled from 1926 to 1930 (sheet 2). This 1,465-foot-deep well penetrated the Chickaloon Formation and intrusive (?) rock (probably diabase sills and dikes) but encountered only uncommercial accumulations of natural gas (Clardy and others, 1984, p. 11).

Both coal mines are part of the Castle Mountain Coal Field, which contains high-quality, low- to medium-volatile bituminous coals that are locally upgraded to anthracite and at least one bed possesses coking qualities. The coal potential in the general area of Mineral Lick #8 is rated high by Merritt and Belowich (1984, sheet 2) because reserves are identified by drilling and the geology is favorable. Merritt and Belowich (1984, table 4) estimate that the minable coal resources in the Castle Mountain Coal Field range from 6.5 to 25 million short tons (high to low assurance values). Although complex and intensive folding, crushing, and faulting and frequent igneous intrusion locally decrease the commercial viability of the coal deposits, these conditions do not eliminate the possibility that small, private coal-mining organizations will be able to profitably explore and develop small-scale coal deposits in the future in the vicinity of Mineral Lick #8.

At the present time, the status of the Castle Mountain Coal Mine is uncertain. According to a DOM source, the leasee of record (Robert W.



Gore of Palmer, Alaska) is dead, but his wife, who claims to have inherited the mine property, is trying to maintain the leases. One of the coal leases (ADL33978) expires July 31, 2008, and the other (ADL53509) has an indefinite duration.

For several decades, geologists have concluded that geologic conditions at the Kings River Coal Prospect do not favor significant development of the coal beds there (Merritt, 1985b, p. 157). However, future small-scale mining is possible. A potential low-gradient access route crosses gravelly alluvium on the floor of Kings River valley from the Glenn Highway to the mine site (sheet 2).

The recent increase in the price of gold may encourage renewed exploration for gold placers in the meltwater channel that passes 0.2 mile north of Mineral Lick #8 (sheet 2). The tenuous nature of the inactive lode claim 2.7 miles west-north-west of the lick makes future lode mining there very unlikely.

Renewed interest in petroleum exploration in the environs of Mineral Lick #8 is extremely unlikely because of unfavorable geologic conditions and the failure of the test well drilled in the area.

#### Mineral Lick #9 (confirmed)

Bedrock at this lick (sheet 2) is the coal-bearing Chickaloon Formation (Barnes, 1962). The lick is situated between the Castle Mountain Coal Mine 0.4 mile east-north-east and the Kings River Coal Prospect 0.9 mile west (sheet 2)(see discussion of Mineral Lick #8). About 1.7 mile east of Mineral Lick #9 is the inactive (1960) placer-gold claim in upper California Creek (Kardex File 85-269)(sheet 2). About 1.7 mile west-north-west of Mineral Lick #9 (sheet 2) is the reported lode claim with no designated mineral content (Kardex File 85-384); this claim was last active in 1978. As previously indicated, the validity of a lode claim at that locality is questionable because the bedrock is Matanuska Formation, which is not known to be metalliferous. The site of Peterson Oil Association Chickaloon No. 1 test well, which was not commercially

viable, is 2 miles southeast of Mineral Lick #9 (sheet 2).

Mineral Lick #9, as is Mineral Lick #8, is part of the Castle Mountain Coal Field, which has high coal potential and is estimated to contain between 6.5 and 25 million short tons of high-quality, low- to medium-volatile bituminous to anthracite (local) coals that have low sulfur contents and heating values ranging from 8,500 to 15,300 BTU/lb (Merritt and Belowich, 1984). Although geologic conditions do not favor large-scale coal mining in this coal field, small-scale coal extraction is not unrealistic.

Renewed placer-mining activity on upper California Creek (in response to high gold prices) could extend westward to within 1 mile of Mineral Lick #9 down the former high-level (2,000 to 2,150 feet elevation) meltwater channel (sheet 2). It is unlikely that the suspect lode claim 1.7 mile west-north-west of Mineral Lick #9 will ever be developed.

Mineral Lick #10 (unconfirmed)

Bedrock at this site (sheet 2) is the Matanuska Formation (Barnes, 1962). It is situated 1.4 mile west of the suspect inactive (1978) lode claim previously discussed (Kardex File 85-384)(sheet 2). The surface copper show described in the discussion of Mineral Lick #7 (Kardex File 85-182) is 1.9 mile north-north-east of Mineral Lick #10 (sheet 2). About 1.6 mile southwest of Mineral Lick #10 (sheet 2) is the Young Creek Coal Prospect (Plangraphics, 1983, p. 114) reported by Merritt and Belowich (1984, sheet 2, locality 13) and by Merritt (1985b, sheet 2, locality 13). However, neither source provides geologic or production information for this prospect. About 2.1 miles southwest of Mineral Lick #10 in a gully at 3,600 feet elevation on the northwestern flank of Red Mountain (sheet 2), Martin (1911) measured 12.2 aggregate feet of coal in a poorly exposed 12.6-foot-thick section of the Chickaloon Formation, including one bed that is 7.4 feet thick (Kardex File 85-178). Merritt (1985b, p. 154) later reported the results of shallow trenching 250 feet higher

on the north side of Red Mountain, where he found one bed of high-volatile C bituminous coal that could be thicker than 25 feet, although he cautioned that this bed could be tightly folded and, therefore, actually only half that thick. The Red Mountain Coal Prospect (Planographics, 1983, p. 114) is 2.6 miles south-south-west of Mineral Lick #10 on the south slope of Red Mountain (sheet 2) (Merritt and Belowich, 1984, sheet 2, locality 12; Merritt, 1985b, sheet 2, locality 12), but I have no information on the geology or production of this prospect. Merritt and Belowich [1984, appendix B, locality 42 (YC1 on sheet 2 this report), 43 (YC2 on sheet 2 this report), and 44 (YC3 on sheet 2 this report)] document three stratigraphic sections containing single coal beds 3, 1, and 1 foot thick, respectively, along lower Young Creek. Proximate and ultimate analyses of the 3-foot-thick bed of bituminous coal at locality YC1 demonstrated that it has low ash content, medium volatile content, low sulfur content, and heating values that range from 13,600 to 15,300 BTU/lb (Merritt and Belowich, 1984, appendix D; Merritt, 1985b, table F5). The coal seams exposed along lower Young Creek are sandwiched between claystones, shales, and sandstones of the Chickaloon Formation. The site of the Kings River Coal Prospect is 2.1 miles east-south-east of Mineral Lick #10 (sheet 2).

Mineral Lick #10 is situated between Castle Mountain Coal Field and Young Creek Coal Field in an area of moderate potential for coal development because of its moderately favorable geologic conditions (Merritt and Belowich, 1984, sheet 2). It is close to the area of igneous rocks considered by them to have nil potential for coal development. The Young Creek Coal Field contains a small volume of potentially minable, medium- to high-volatile bituminous coals, estimated at 2.5 to 8 million short tons (high to low assurance values) (Merritt and Belowich, 1984, table 4). As indicated in the discussion of Mineral Lick #8, the Castle Mountain Coal Field is considered to have high potential for coal development. However, industry has apparently had no serious interest in developing the coal deposits on the flanks of Red Mountain and the coal seams cropping out along lower Young Creek are probably too thin

to be commercially minable. No drilling has been conducted in the area so the subsurface potential remains unknown; however, the coal-bearing section over basement rock is probably thin. As mentioned previously, development of Kings River Coal Prospect is also unlikely.

If serious development of low-magnesian limestone beds in Kings River valley occurs, as discussed in sections on Mineral Licks #6 and #7, an access road up the valley floor could pass as close as 1.7 mile east and 1,400 feet lower than Mineral Lick #10 (sheet 2).

There seems to be little potential for development of metallic lodes within 2 miles of Mineral Lick #10. However, placer mining may occur in the terraces and floodplain of Kings River as close as 1.5 mile to the east (sheet 2). If an access road is extended up Kings River valley, gravels will undoubtedly be mined from fluvial terraces in the valley.

Mineral Licks #12 and #20 (confirmed) and #13 (unconfirmed)

Discussions of these mineral licks are combined because they occur within 1 mile of each other (sheet 2) and they are all underlain by the same bedrock type, a diabase intrusive complex, although Mineral Licks #12 and #20 are close to the contact with the Chickaloon Formation (Barnes, 1962). The surface mineral occurrences closest to this group of mineral licks are outcrops of coal {sample sites YC1 and YC2 (Kardex File 85-179) of Merritt and Belowich, 1984, sheet 2} 0.6 mile south and 0.6 mile east-north-east of Mineral Lick #12, respectively (sheet 2)(see discussion of Mineral Lick #10). Merritt and Belowich (1984, sheet 2, locality YC3) also measured a 1-foot-thick bed of bituminous coal in the Chickaloon Formation along lower Young Creek 1.2 mile south of Mineral Lick #13 (sheet 2). The Red Mountain Coal Prospect is 1 mile northeast of Mineral Lick #12 and the Young Creek Coal Prospect is 2.2 miles north-north-east of the same lick (Merritt and Belowich, 1984, sheet 2, localities 12 and 13, respectively)(sheet 2).

This group of mineral licks occurs within the Young Creek Coal Field,

which contains an estimated 2.5 to 8 million short tons (high to low assurance values) of potentially minable, medium- to high-volatile bituminous coals (Merritt and Belowich, 1984, table 4). The general potential for finding commercially viable deposits in this field is considered to be moderate because significant coal resources have been identified in the general area, although most known coal beds are thin and the geologic structure is complex due to tight folding, numerous faults, and widespread intrusion of diabase sills along shale and coal beds. The presence of an extensive diabase intrusive in the immediate vicinity of the mineral-lick group greatly reduces the likelihood of finding commercially valuable coal or metallic-mineral deposits there.

Mineral Lick #14 (unconfirmed)

Bedrock at this locality (sheet 2) is part of the diabase dike-sill complex that intrudes the coal-bearing sedimentary rocks elsewhere in the middle and eastern Matanuska Valley (Barnes, 1962). The nearest surface exposure of coal, a 1-foot-thick seam of bituminous rank, crops out along lower Young Creek 0.6 mile west-north-west of Mineral Lick #14 (Merritt and Belowich, 1984, sheet 2, locality YC3)(sheet 2). An inactive (1977) claim for montmorillonite clay (Kardex File 85-334) is located about 0.6 mile south-south-west of Mineral Lick #14 near the mouth of Young Creek (sheet 3). About 0.6 mile farther in the same direction is an outcrop along the Glenn Highway of the shaly facies of the Matanuska Formation. When heated in an oven to high temperatures, this rock swells (bloats) sufficiently to produce a low-density aggregate (haydite) that is suitable for mixing with cement to form light-weight concrete (Rutledge and others, 1953; Eckhart and Plafker, 1959; Warfield, 1962). A claim for haydite at this locality (Kardex File 85-10)(sheet 3) has not been active since 1979. About 1 mile southeast of Mineral Lick #14 (sheet 3) is a long-inactive (1954) claim for building stone, probably in a fairly massive graywacke facies of the Matanuska Formation (Kardex File 85-72).

Mineral Lick #14 is located in the Young Creek Coal Field in an area

thought to have generally moderate potential for coal development (Merritt and Belowich, 1984, sheet 2). However, the diabase bedrock in the immediate vicinity of the mineral lick greatly decreases the likelihood of finding commercially significant coal or metallic-mineral deposits there.

Mineral Lick #16 (unconfirmed)

Bedrock at this site (sheet 2) is mapped as Matanuska Formation (Barnes, 1962). Search of the technical literature located no information on specific occurrences of coal or metallic minerals within 2 miles of Mineral Lick #16 nor have any mineral claims been staked within 2 miles of the lick. However, Martin and Katz (1912, p. 95) reported rumors of small quantities of placer gold in the gravels of Granite Creek, which flows as close as 2.1 miles west of Mineral Lick #16 and 1,650 feet lower (sheet 2). The recent increase in the price of precious metals may provide impetus for placer mining in Granite Creek and its tributaries. However, the Matanuska Formation beneath the mineral lick will undoubtedly not be a source of commercial precious-metal deposits and the tributary along which Mineral Lick #16 occurs should remain generally undisturbed by minerals-related activities.

Mineral Licks #15 and #19 (confirmed)

Discussions of these two mineral licks are combined because they are close (0.3 mile apart)(sheet 2) and the bedrock around them is thinly buried, coal-bearing Chickaloon Formation (Barnes, 1962). Except for a literature citation of coal cropping out about 1.4 mile south of Mineral Lick #15 (Kardex File 85-177)(sheet 3), review of the technical literature uncovered no references to specific mineral occurrences within 2 miles of this pair of mineral licks. Nonetheless, they occur within a zone judged to have generally moderate potential for commercially viable, high-volatile bituminous coal deposits (Merritt and Belowich, 1985, sheet 2). Lack of encouraging surface exposures and a widespread

cover of glacial and glaciofluvial deposits that obscures coal beds require an expensive subsurface exploration program before coal mining can occur in the vicinity of Mineral Licks #15 and #19. This scenario seems unlikely in the foreseeable future considering the low prices of competitive energy sources.

The lack of surface indications of metallic mineralization in the immediate environs of Mineral Licks #15 and #19 discourages local activities related to precious-metal extraction, although lower Granite Creek, which conceivably could bear attractive gold placers in present bull-market conditions, is about 0.5 mile west of Mineral Lick #19 and about 500 feet lower (sheet 2).

Mineral Lick #17 (confirmed)

Bedrock beneath this hillside (sheet 2) is Matanuska Formation (Barnes, 1962). Except for a literature reference to coal in the Chickaloon Formation about 0.9 mile south-south-east (Kardex File 85-177)(sheet 3), there are no references to mineral exposures within 2 miles of Mineral Lick #17. The type of bedrock, which is not known to contain commercial accumulations of coal or precious metals, and the remoteness of this site make the likelihood of viable mineral development near Mineral Lick #17 close to nil.

Mineral Lick #18 (unconfirmed)

Although it is covered by an unknown thickness of high-level glaciofluvial gravels, bedrock at this site (sheet 3) is thought to be coal-bearing Chickaloon Formation (Barnes, 1962). The closest surface exposure of coal is 1.3 mile east-north-east (Merritt and Belowich, 1984, sheet 2, locality YC3)(sheet 2). The 1977 montmorillonite clay claim previously discussed (see section on Mineral Lick #14) is about 1.5 mile east-south-east (Kardex File 85-334)(sheet 3). About 1.4 mile southeast of the mineral lick is the 1979 claim for haydite along the Glenn Highway (Kardex File 85-10)(sheet 3). About 1.6 mile west-south-

west of Mineral Lick #18 is the site of a coal exposure mentioned in the literature (Kardex File 85-177)(sheet 3).

Mineral Lick #18 is situated between the Young Creek Coal Field and the Eska-Moose Coal Field in an area considered by Merritt and Belowich (1984, sheet 2) to have moderate potential for coal development. However, the thick cover of younger gravels greatly reduces the likelihood that commercial accumulations of coal will be located without extensive and very expensive exploratory drilling (Barnes, 1962). Compared to other nearby localities where commercial deposits of coal are known and accessible, the likelihood of developing coal in the vicinity of Mineral Lick #18 is nil. The lack of surface indications of metallic mineralization in the vicinity of Mineral Lick #18 and the type of bedrock, which is not known to contain metalliferous minerals, make mining for precious and other metals very unlikely.

#### Rationale

Mineral potential is a very difficult parameter to establish with credibility, especially in an area like the Matanuska Valley Moose Range, where site-specific minerals information is very limited or lacking and the collection of adequate new subsurface data is not a viable option. Applying ratings like high potential or low potential is very misleading because the reader assumes that rank assignments are all based on equivalent and adequate amounts of reliable data. This is rarely the situation. In reality, mineral potential ratings generally correspond to the amount of minerals information available, not the degree and type of mineralization or value of the resource because these factors are rarely known. Where more minerals information is available, relatively high mineral potentials are routinely assigned, even by knowledgeable professionals who are trying to be as objective as possible. At the other end of the scale, lack of information or absence of past minerals-related activities are also frequently and erroneously used to assign low mineral potentials. To credibly assign mineral potentials to a given area, several geological



and geophysical measurements (including rock type, geochemistry, terrane type, known mineral occurrences, aerial radiation, gravity, and aeromagnetism) as well as claim locations and status must be evaluated by a competent person. In addition, because geologic information is rarely collected in a statistically significant manner (as in a grid pattern using random-number tables), some expression of data reliability should accompany each map of mineral potential. This type of data package was assembled by DGGs geologists for the DNR Northwest Alaska Area Plan and the DNR Kuskokwim Area Plan.

In general, mineral potential cannot be reliably assigned to very small features, like mineral licks, without site-specific data but is more appropriately used for large areas involving dozens to thousands of square miles. For example, Merritt and Belowich (1984, sheet 2) used considerable coal information (both surface and subsurface) to broadly assign four levels of coal potential in Matanuska Valley. Yet, as indicated in my discussions of specific mineral licks, local conditions frequently do not match average or general conditions in the area to which the rating is assigned.

In my opinion, the critical issue with regard to the fifteen mineral licks being considered for permanent mineral closures is not their mineral potentials but whether or not minerals-related development will likely occur close enough to the mineral licks to deleteriously impact wildlife use of them. Whether or not a mineral claim, coal lease, prospect, or mine will be established at a particular location depends not only on geologic conditions, but also on land status (which will be significantly changed by permanent mineral closures), regulatory climate, available technology, and economic conditions (Bundtzen, Eakins, and Conwell, 1982; Louis Berger and Associates, 1983; Cook, 1983; Eakins and others, 1983, 1985; Bundtzen and others, 1984, 1986). Further, because of time, funding, and staff constraints, potentially significant geochemical and geophysical information has not been incorporated into my analysis. Assigning reliable mineral-potential ratings under these

conditions is not realistic. For these reasons, only the likelihood of significant future mining activities in the vicinities of specific mineral licks will be discussed, based on known facts of geology and land status. DOM personnel are much better qualified than I to address regulatory, political, and economic factors and I assume that they will do so during future deliberations.

#### Discussion

Geologic and land-status factors that influence the likelihood of future mineral development at and near mineral licks in the Matanuska Valley Moose Range include type of bedrock, favorability of local bedrock for mineralization, known mineral occurrences, current mining activity, past mining activity, and presence of access corridors. For each of the ten confirmed and five unconfirmed mineral licks identified by ADFG, these factors are summarized in Table 1. A radius of 2 miles around each mineral lick is arbitrarily chosen as an outer limit of consideration to help focus the discussion. I lack the biological training to judge whether or not this limit is appropriate for each animal species that uses or could use the mineral licks, but 2 miles seems to be a generous distance from the mining point of view. Local influences like topography, plant cover, nearness of water, availability of food sources, and predation will also affect the behavior of the animals. For the purposes of this discussion only, I assume that existing mineral closures will not affect future mining activities and that mineral deposits near licks can be developed if economic conditions allow. Obviously, decisions made next summer on the permanence of existing mineral closures could seriously impact mineral development.

Two areas are clearly most likely to be mined in the future because there are valid existing mineral claims or coal leases. The present high price of gold likely will encourage continued placer mining on Puddingstone Creek, where there are valid placer claims (ADL327374-ADL327381), and may stimulate revitalization of placer claims on the un-named tributary to Chickaloon River south of Mineral Lick #4 (Kardex File 85-380)(sheet

Table 1. Summary of geologic conditions, status of mineral claims and leases, and history of minerals-related activities in the vicinities of selected mineral licks, Matanuska Valley Moose Range, Alaska.

MINERAL LICK	BEDROCK TYPE	LOCAL BEDROCK COAL?	FAVORS METALS?	KNOWN COAL W/IN 2 MILES	KNOWN METALS W/IN 2 MILES	ACTIVE LEASE W/IN 2 MILES	ACTIVE CLAIM W/IN 2 MILES	INACTIVE CLAIM W/IN 2 MILES	CLAIM TYPE	LAST ACTIVE	KARDEX FILE	ACCESS CORRIDOR W/IN 2 MILES
4	Talkeetna Fm	No	Yes	No	Yes	No	ADL327374- ADL327381	Yes	Placer	1973 1975	85-380 85-434	Yes
6	Granitic Intrusive	No	Yes	No	Yes	No	No	Yes	Placer	1980	85-439	Yes
7	Granitic Intrusive	No	Yes	No	Yes	No	No	Yes	Lode	1975	85-270	Yes
8	Chickaloon Fm	Yes	No	Yes	Yes	ADL33978 ADL53509	No	Yes	Placer	1960	85-269	Yes
9	Chickaloon Fm	Yes	No	Yes	Yes	ADL33978 ADL53509	No	Yes	Placer Lode	1960 1978	85-269 85-384	Yes
10	Matanuska Fm	No	No	Yes	Yes	No	No	Yes	Lode	1978	85-384	Yes
12	Diabase Intrusive	No	No	Yes	No	No	No	No	--	--	--	Yes
13	Diabase Intrusive	No	No	Yes	No	No	No	No	--	--	--	Yes
14	Diabase Intrusive	No	No	Yes	No	No	No	Yes	Lode	1977 1979	85-334 85-10	Yes
15	Chickaloon Fm	Yes	No	Yes	Yes	No	No	No	--	--	--	Yes
16	Matanuska Fm	No	No	No	No	No	No	No	--	--	--	No
17	Matanuska Fm	No	No	Yes	Yes	No	No	No	--	--	--	Yes
18	Chickaloon Fm	Yes	No	Yes	Yes	No	No	Yes	Lode	1977 1979	85-334 85-10	Yes
19	Chickaloon Fm	Yes	No	Yes	Yes	No	No	No	--	--	--	Yes
20	Diabase Intrusive	No	No	Yes	No	No	No	No	--	--	--	Yes

1). Reopening or expansion of the Castle Mountain Coal Mine is less likely because of the death of the leasee of record and because most of the known coal reserves in the open-pit mine have been excavated, although some coal is stockpiled at the site. Drilling of closely spaced exploration holes will be required to adequately define remaining minable coals in this area. Existing coal leases have a lifetime of 21 years (ADL33978) and an indefinite lifetime (ADL53509). If the Castle Mountain Coal Mine is reactivated, the trail/road from it to the Chickaloon/Drill Lake road will bear increased vehicular traffic and the human presence in the vicinities of Mineral Licks #8 and #9 will increase (sheet 2).

Because of their close proximity to a major access route up Kings River valley, Mineral Licks #6 and #7 could be affected if Native interests decide to develop the low-magnesian limestones in the drainage basin (sheets 1 and 2). The current upsurge in the price of gold may trigger exploration and development of placer and lode properties in granitic intrusive rocks in the upper valleys of Kings River and Granite Creek. Traffic related to placer and lode mining in these basins could affect animal use of Mineral Licks #6 and #7. Elevation differences of several hundred feet between Mineral Licks #10, #15, #17, and #19 and potential access routes up the floors of Kings River and Granite Creek valleys (sheet 2) make disturbance by road traffic much less likely. However, Mineral Licks #15, #17, and #19 are less than 1 mile from a potential route up Granite Creek and hunting pressure may increase.

Another possible area close to a mineral lick that could be profitably prospected for placer gold and developed into a placer mine is the high-level meltwater channel that trends west-south-west at about 2,000 feet elevation 0.2 mile north of Mineral Lick #8 (sheet 2). However, the placer claim on upper California Creek downslope of this possible source of placer gold has been inactive for the past 27 years, even when gold prices rivaled or exceeded today's high prices.

Although the Chickaloon Formation is widespread in Matanuska Valley

and is known to contain commercially valuable coal seams, available information does not encourage exploration and development of coal resources in the vicinities of Mineral Licks #10, #12, #13, #14, #15, #17, #18, #19, and #20 (sheets 2 and 3). Lack of current interest in mining the Matanuska Formation for haydite (Kardex File 85-10), montmorillonite clay (Kardex File 85-334), and building stone (Kardex File 85-72) indicates that future mining of this rock unit near Mineral Licks #10, #16, and #17 (sheet 2) is very unlikely. In addition, Mineral Lick #16 is the most remote of the fifteen mineral licks from potential influences by mining (sheet 2, table 1). Diabase sills and dikes in the vicinities of Mineral Licks #12, #13, #14, and #20 have attracted little, if any, interest from the minerals industry, indicating that there is little future for mineral development in these intrusive rocks.

#### Summary

Based on a small amount of mineral information for fifteen mineral licks in the Matanuska Valley Moose Range, future conflicts are most likely for confirmed licks #4, #8, and #9 and slightly less likely for confirmed licks #6 and #7. There are few encouraging signs of economically viable exploitation opportunities close to the other ten mineral licks identified by ADFG.

#### Acknowledgements






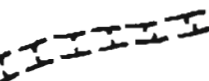
This report has been reviewed for clarity, completeness, and accuracy by Thomas K. Bundtzen (DGGs mineral expert) and Roy D. Merritt (DGGs coal expert). Their technical knowledge, input, advice, and efforts are greatly appreciated. Errors of fact or logic in this report remain my responsibility.

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EXPLANATION FOR SHEETS 1 THROUGH 3

- ML4(c) Mineral lick selected and confirmed by ADFG
- ML16(u) Mineral lick selected but not confirmed by ADFG
- ▲—YC2 Field locality of measured stratigraphic section (Merritt and Belowich, 1984, sheet 2)
- KF85-72  
KF85-380 Approximate location of minerals or claim-activity information in DOM Kardex File
- CASTLE MOUNTAIN  
COAL MINE Approximate location of coal mine cited in text
- YOUNG CREEK  
COAL PROSPECT Approximate location of coal prospect cited in text
- RAM  
PROSPECT Approximate area of pyrrhotite body cited in text
- Approximate location of high-level former sideglacial meltwater channel