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Mineral Resources of the Trans-Alaska Pipeline Corridor

UNITED STATES DEPARTMENT OF THE INTERIOR

Information Circular 8626

Mineral Resources of the Trans-Alaska Pipeline Corridor

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UNITED STATES DEPARTMENT OF THE INTERIOR
Rogers C. B. Morton, Secretary

BUREAU OF MINES
John D. Morgan, Jr., Acting Director

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MINERAL RESOURCES OF THE TRANS-ALASKA PIPELINE CORRIDOR

by

John J. Mulligan[1]

ABSTRACT

The Bureau of Mines investigated reports of mineral deposits within 10 miles of the route of the proposed pipeline from Prudhoe Bay to Valdez. No producing lode deposits or lode prospects of possible national economic significance were found. Measured placer deposits in the route are of slight value except possibly some deeply buried gold placer deposits in the Fairbanks and Livengood Quadrangles. The pipeline corridor crosses five belts of minerals having potential economic value: (1) The north slope of the Brooks Range (oil, gas, oil shale, coal, phosphate); (2) the south slope of the Brooks Range (copper, gold); (3) the Livengood area (gold); (4) the Fairbanks area (gold, lead-silver, antimony); and (5) the Wrangell Mountains-Denali copper belt (copper-gold). The Jarvis Creek coalfield, an eastern extension of the Nenana coalfield, is on the north side of this belt. Scattered along the corridor across the Chugach Mountain and in the vicinity of Valdez are a wide variety of metallic deposits that make up the eastern margin of the Chugach gold belt but do not seem to constitute a well-defined zone.

INTRODUCTION

This report shows the locations of known deposits of metallic minerals, nonmetallic minerals, and mineral fuels within about 10 miles of the proposed Trans-Alaska Pipeline. Some sand, gravel and rock deposits are noted but obviously many of these numerous and widespread deposits are not included. The available information on mineral deposits is summarized briefly, the locations are shown on maps, and the more pertinent references are listed. For convenience and clarity each quadrangle is considered separately.

Reports of deposits of metallic minerals, nonmetallic minerals and mineral fuels on or near the proposed Trans-Alaska Pipeline route from Prudhoe Bay to Valdez were investigated. Some were checked in the field during the summer of 1971, but most could not be checked because of time and personnel limitations.

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[1]Supervisory mining engineer.

The investigation was deposit oriented rather than claim or lease oriented. No attempt was made to exactly locate mineral claims or leases or to determine their current validity. Many claims have been staked recently, and many claims both old and new cannot be located from the public records. The Alyeska Pipeline Co. has a staff of landsmen working on this problem.

The list of references at the end of the paper contains only the more pertinent references. The bibliographies included in the reference publications can be used for more detailed studies.

Maps of the oil and gas leasing blocks that blanket the north slope of the Brooks Range and the Arctic coastal plain have not been included, but the southern limit of leasing activity is shown on the Philip Smith Mountains quadrangle map. The few oil and gas leases and reports of gas in wells south of the Brooks Range are shown on the maps and described briefly.

ACKNOWLEDGMENTS

Compilation of the data for this report was a team effort with the author serving as coordinator. Donald Blasko provided all data on petroleum occurrences and also provided information on the Beechy Point and Sagavanirktok Quadrangles. Bruce Thomas and Arthur Kimball collaborated on the Philip Smith, Chandalar, Wiseman, Bettles, and Beaver Quadrangles. Bruce Thomas did the Tanana, Livengood and Fairbanks Quadrangles. Robert Warfield, Arthur Kimball, Raymond Maloney (now deceased), and Robert Bottge collaborated on the Big Delta, Mt. Hayes, and Gulkana Quadrangles with Arthur Kimball doing almost all of the Mt. Hayes Quadrangle. Tom Pittman did the Valdez Quadrangle. Robert Warfield provided all data on coal occurrences.

Base maps are from the preliminary geologic maps of the proposed Trans-Alaska Pipeline route compiled by Reuben Kachadoorian, Oscar Ferrians, Jr., and Florence Weber, geologists, of the U.S. Geological Survey in 1971. The surface geology for 3 to 5 miles on either side of the pipeline route was investigated and mapped. Deposit locations are principally from the State of Alaska, Department of Natural Resources Kardex files of mineral claim locations, and from the publications listed in the bibliography. Members of the Bureau of Mines staff and others having local knowledge of the various areas contributed information, but specific contributions were not recorded.

PIPELINE ROUTE

The proposed Trans-Alaska Pipeline would follow a sinuous but reasonably direct course from a collection point near Prudhoe Bay on Alaska's north coast almost due south to a deepwater port on the south side of Valdez Arm on Prince William Sound. The airline distance is over 600 miles; the actual pipeline would be about 30 percent longer. This report describes the mineral deposits known to occur within about 10 miles of the proposed pipeline.

The pipeline route shown in this report was selected on the basis of engineering and environmental criteria. Minor changes may be made as a result of more detailed studies of local environmental or engineering problems, or

because of other local considerations; but no changes are anticipated that would move the pipeline outside the study area.

The Bureau of Land Management is classifying and setting aside land for the pipeline corridor. This has not been completed; therefore the legally defined pipeline corridor is not shown in this report. As currently planned the lands set aside would include a corridor extending at least a mile or two outward from each side of the pipeline. This corridor would be closed to all types of entry. A zone extending outward 1 to 3 miles or more from each side of this inner corridor would be closed to all forms of entry except for minerals locatable under the mining law. The boundaries of both the inner corridor and the outer zone would conform with present land subdivision boundaries. The widths therefore would be highly irregular.

MINERAL RESOURCES

The proposed pipeline crosses no producing lode mines and no metallic load deposits of national economic importance, either known or inferred. It passes near the Jarvis Creek coal deposits in the Mt. Hayes Quadrangle, which are being mined on a small scale. The route crosses or follows many gold placer streams, but measured placer deposits in these streams are of slight economic value. A possible exception may be one or two deeply buried gold placers in the southeast part of the Livengood Quadrangle or in the Fairbanks Quadrangle that were not mined because of technical difficulties. Their value is not known, but undoubtedly sampling data exists in company-confidential files.

The pipeline route crosses five distinct mineralized zones that have had, or may in the future have economic significance.

From the start in the Beechey Point Quadrangle through the Sagavanirktok Quadrangle to the middle of the Philip Smith Mountains Quadrangle the route crosses the north coastal plain and the north slope of the Brooks Range. This forms a sedimentary mineral province characterized by oil, gas, oil shale, coal, and phosphate deposits. The southern limit of oil leasing interest is shown on the Philip Smith Mountains Quadrangle.

The second zone is on the south slope of the Brooks Range and roughly includes all of the Wiseman and Chandalar Quadrangles and the northern quarter of the Bettles Quadrangle. This zone is characterized by copper and gold deposits with some lead-silver and antimony. Coal deposits are known but scarce. The westward extension of this zone includes the Kobuk copper deposits.

The third zone is on an east-west trending belt of gold placer deposits 10 to 15 miles wide that crosses the center of the Livengood Quadrangle. The placer gold is derived from quartz veins associated with antimony and lead-silver deposits. Cassiterite is a common accessory mineral in the placers 20 to 40 miles west of the pipeline but is scarce where the pipeline crosses.

The fourth zone is the well-known gold placer and lode zone in the northwest quarter of the Fairbanks Quadrangle and extending into all the adjacent quadrangles. This zone has been a major placer-gold producer and the scene of persistent small-scale lode-gold and lead-silver mining. The gold placers include traces of cassiterite and scheelite. The placer gold is derived from quartz vein deposits associated with antimony and lead-silver deposits.

The fifth zone, the Wrangell Mountains-Denali copper belt, is crossed in the southern third of the Mt. Hayes Quadrangle and the northern third of the Gulkana Quadrangle. This belt is characterized by widespread copper-bearing greenstones and associated copper deposits that are not well understood. In recent years this belt has been extensively prospected both east and west of the pipeline route. The previously mentioned Jarvis Creek coalfield is on the north side of this belt in the Mt. Hayes Quadrangle.

Between the copper belt and Valdez Arm the pipeline passes over the Chugach Mountains to Valdez. Scattered deposits of a wide variety of metallic minerals make up the eastern margins of the Chugach gold belt, but do not seem to constitute a well-defined zone.

In the sections that follow the mineral occurrences are identified on maps by a number that refers to a numbered description in the text.

Beechey Point Quadrangle

The proposed pipeline starts in this quadrangle. The entire area is included in oil and gas leases. There are no known metalliferous deposits. Large amounts of sand and gravel are mined from the Sagavanirktok riverbed and other stream deposits for road, airfield, oil drilling pad, and camp construction. No coal outcroppings have been reported and drilling logs are not available (1).[2]

Sagavanirktok Quadrangle

Throughout this quadrangle the pipeline route is on the Arctic slope. The entire quadrangle is in the area of interest for oil and gas leasing. No metalliferous deposits are known. Sand and gravel is obtained from stream deposits. Extensive areas are underlain by Tertiary deposits, some of which probably are coal bearing.

The area along the pipeline route in this quadrangle contains the following mineral deposits:

1 and 2: Possibly extensive areas are underlain by subbituminous- and lignite-bearing Tertiary rocks (1, p. 16).

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[2] Underlined numbers in parenthesis refer to items in the list of references at the end of the report.

Philip Smith Mountains Quadrangle

In the northern half of this quadrangle the pipeline route is included in the area of interest for oil and gas leasing. Oil shale, coal, or phosphate deposits may be present (1). In the southern half of this quadrangle the pipeline route crosses the center of the Brooks Range where no mineral deposits are known. The copper-gold metallogenic province on the south slopes of the Brooks Range extends a short distance into the southeast corner of this quadrangle (11).

The area along the pipeline route in this quadrangle contains no recorded mineral deposits.

Chandalar Quadrangle

In the Chandalar Quadrangle the pipeline route enters a metallogenic zone that entends along the south slopes of the Brooks Range (4, 8, 11). This zone is not well known but apparently is characterized by copper and gold. Lead, silver, zinc, antimony, nickel, and platinum also have been reported. Mining has been limited to placer and lode gold.

The area along the pipeline route in this quadrangle contains the following mineral deposits (29):

1. Snowden Creek: A slightly discolored gypsum-calcite zone 6 inches thick parallels apparent bedding in a shaley limestone bluff. The zone contains abundant fine-grained pyrite but no detectable base or ferroalloy metals. Sparse goethitic vein quartz float from uphill talus contains traces of graphite, pyrite and chalcopyrite. Chromium, lead, nickel, and vanadium were detected spectrographically. The bedrock source of the vein quartz was not found.

2. Mathews River: Very small amounts of arsenopyrite, galena, chalcopyrite, and sphalerite were found in iron-stained quartz float just below a massive 3-foot white quartz bein that is exposed for a 100-foot strike length. No sulfides were seen in place. One sample from the quartz vein assayed 0.1e oz gold and trace of silver per ton.

3. Quartz Creek: A 2-inch-thick N 25° W-striking vertical quartz vein containing minor goethite and malachite and a trace of zinc cuts chlorite schist. A few small fragments of float containing traces of malchite and one with possible chalcopyrite grains were seen nearby.

4. Linda Creek: This creek is about 5 miles long with its lower segment consisting of gold-bearing stream washed gravel about 7 feet deep. It was discovered in 1901; currently it is being mined by hand and hydraulic methods, and is covered by unpatented mining claims.

5. Gold Creek: Placer gold was discovered in the summer of 1900. The creek has three levels of concentration: a high channel, present creek channel, and a deeply buried channel. All of the channels have been mined at various times. Some small-scale hand mining has been reported currently, and it is held with unpatented mining claims.

6. Magnet Creek: The creek and bench channels of Magnet Creek have been worked at various times, but not currently. Mining claims are unpatented.

7. Middle Fork-Sheep Creek: Deeply buried gold-bearing gravels have been drift mined in the Middle Fork Valley at the mouth of Sheep Creek. The lower limits of this channel have not been defined.

8. Sheep Creek: Sheep Creek is a small stream with a fairly steep gradient. Coarse gold has been recovered from its present stream channel, which is about 6 feet deep. A buried channel at the lower end of Sheep Creek Valley was mined by underground methods.

9. Nugget Creek: Fair gold prospects with very little mining appears to justify more investigation.

10. Rainbow Gulch: Very little mining in Rainbow Gulch, but fair gold prospects indicate further investigation would be justified.

11. Howard Creek: Chloritic schists with quartz, muscovite, garnet, ankerite-magnesite, and graphite contain cherry-sized pods of quartz and pyrrhotite with traces of galena and chalcopyrite. Goethite stains around the pods exaggerate their apparent size. Pods appear widely, but very sparsely, distributed. Fine pyrite veinlets containing traces of copper follow schist joints and fractures at several localities.

12. Myrtle Creek: One of the biggest gold producers in the Koyukuk district, it was discovered in 1899. Gold was mined from stream gravels 2 to 4 feet deep by hand methods. Deeper gravels were mined by hydraulic methods and with draglines and bulldozers. Currently it is idle, but held with unpatented mining claims.

13. Slate Creek: Gold was discovered on Slate Creek in 1899. Shallow creek and bench gravels formerly were mined by hand and hydraulic methods, but currently are being worked by the bulldozer-sluice plate method. Unpatented mining claims appear to cover the workable paystreak.

Wiseman Quadrangle

In this quadrangle the pipeline route continues through the metallogenic zone characterized by copper and gold deposits (2, 7-8, 11). The area along the pipeline route in this quadrangle contains the following mineral deposits (29):

1. Canyon Creek: Traces of gold were found in the canyon in the lower reaches of the creek, but the broad valley of upper Canyon Creek also appears favorable for gold concentration.

2. Washington Creek: About $5,000 worth of gold was produced from Washington Creek by 1909. Although there is gold in the gravels, recoveries have not been sufficient to make mining attractive.

3. Vermont Dome: Vein quartz with traces of copper and zinc occur as float near the crest of the spur that extends southward from Vermont Dome. Light-brown vein quartz with sparse iron sulfides, minute pods of goethite, and a light-green stain along fracture planes occur in schist talus. Broken fragments of fairly large quartz crystals are nearby.

4. Vermont Creek: In the lower part of the creek frozen buried placers 90 feet deep were mined for coarse gold by drifting methods. In the upper section, creek gravels were mined by opencut methods. Although currently idle, it is reported to be held by unpatented claims.

5. Smith Creek Dome: Small pieces of combined stibnite, cervantite, stibiconite, and kermesite are on the dump of a small pit. A 6-inch stibnite vein in schist is reported to have been exposed in the bottom of the pit.

6. Lofty Creek: Some gold was recovered at the mouth of the creek near the Hammond River. Currently it is inactive.

7. Hammond River: Deep-buried, frozen gold-bearing gravels (in places thawed on bedrock) were mined by drifting methods near the mouth of Hammond River. The paystreak extends into the Middle Fork Valley. Much coarse gold was recovered from this paystreak with nuggets reportedly worth $800 to $1,000. Bench gravels upstream from the mouth of the river were worked by opencut methods and also yielded coarse gold. It is covered by unpatented mining claims.

8. Fay Creek: Rough, angular gold with quartz attached was recovered from the frozen gravels of Fay Creek by both opencut and drifting methods. Mining claims are unpatented.

9. Archibald Creek: This creek is 1½ miles long with coarse, subangular, frozen gravel containing smooth and flattened fine gold and coarse and rough porous nuggets. The shallow creek gravels of Archibald Creek were mined by hydraulic and hand methods; the deeply buried frozen gravels were drifted. Currently the bench gravels near the mouth of the creek are being opencut by hand methods. Mining claims are unpatented.

10. Jones and Boyle Antimony Prospect: Quartz veins containing stibnite are exposed in the bedrock of an old placer cut on the north side of Smith Creek near the mouth. Near the midsection of the cut are seven parallel stibnite-bearing quartz veins in a zone about 80 feet wide that pinch and swell and range 1 to 6 inches wide. A chip sample across the 6-inch vein shows 33.8 percent antimony. A chip sample from a vertical stibnite-rich quartz stringer 1½ inches wide exposed in the eastern section of the cut shows 44.5 percent antimony.

11. Nolan Creek: The gold placers in the basin of Nolan Creek include bench, shallow gulch, and deeply buried frozen deposits. Most of the gold comes from deeply buried frozen gravels, about 135 feet deep, that are mined by drifting methods. Mining claims are unpatented.

12. Wannamaker-Wortman Antimony: A stibnite vein 3 to 4 inches wide is exposed in a trench that is perched about 150 feet above water level on the south side of Smith Creek, near its mouth. The vein appears to follow a well-defined vertical fissure that cuts across a flat-lying, blue-gray phyllite with distinct basal fracture cleavage. The vein is exposed about 8 feet along the strike. Analysis of a chip sample across the vein where it is 3 inches wide shows 58.3 percent antimony.

13. Smith Creek: A rich left-limit tributary of Nolan Creek that was worked by hand until the 1960's; it had a small steady production. Claims are unpatented.

14. Swift Creek: A small tributary of the Hammond River; it was mined by hand methods. The gold is coarse and covered with a white mineral substance.

16. Confederate Creek: This is a small gulch that is reported to contain coarse gold, but apparently not sufficient to encourage mining.

17. Union Creek: Some coarse gold was recovered by hand methods from this small gulch, but it is now idle.

18. Midnight Dome: Fine to coarse crystalline stibnite from the dump of two shallow pits assay 62 percent antimony. According to reports a 6-inch vein of stibnite enclosed by mica schist was uncovered in the bottom of one of the pits.

19. Jap Creek: Gold has been found on Jap Creek, but not enough to encourage mining.

20. Minnie Creek: Considerable prospecting has been done on Minnie Creek. Coarse gold was recovered in places, but water at bedrock discourages shaft sinking and drift mining. Reports of the early prospecting results appear to justify further investigations.

21. Wiseman Creek Canyon: Trace amounts of chalcopyrite and chrysocolla were detected in a grab sample of float quartz and dogtooth spar gypsum from talus at the lower entrance to Wiseman Creek Canyon. Iron-stained drusy quartz and dogtooth spar occur as narrow veins in mica schist.

22. Roches Moutonnees: Quartz with traces of copper and zinc occur as veinlets in dolomite and limestone. The enclosing rocks outcrop as roches moutonnees (rounded hummocks) to form distinct local features on the west flank of the Middle Fork Valley. A bleb of bornite, about the size of the head of a match, was detected megascopically in fresh-broken quartz, but no other copper minerals were found.

23. Sawyer Creek: Some gold has been found in coarse gravel on Sawyer Creek, but there is no evidence of mining.

24. Marion Creek: Considerable prospecting has been done on Marion Creek, but sufficient gold to justify mining was never found.

25. Emma Creek: A rich gold deposit was formed by a steep gradient stream flowing through a narrow, boulder-laden gulch. The boulders make mining difficult, but currently it is being mined on a small scale. Placer claims are unpatented.

26. Clara Creek: Some gold placer mining was done on Clara Creek in 1901, and also in 1934.

27. Porcupine Creek: Coarse gold is recovered from gravel 20 feet deep that contains many boulders. Currently it is being mined by bulldozer hydraulic methods. Some drift mining was done in deep frozen gravels.

28. Twelvemile Creek: The gravels are said to contain a little gold, but this creek has been worked only occasionally, with little reward.

29. Mail Box Creek: Hand mining on Mail Box Creek recovered flakey fine gold disseminated in the upper fine gravel and rough coarse gold from iron-stained gravel on bedrock.

30. Tramway Bar: A deposit of gold-bearing stream gravel on a bench cut into conglomerate and sandstone about 100 feet above the Middle Fork has been mined sporadically for many years. Mining claims are unpatented.

31. Chapman Creek: About ¼ mile from the mouth, prospect shafts 9 to 14 feet deep along the creek show gold on bedrock. Bench deposits 20 to 30 feet above the creek also show gold in bedrock. Inadequate water has discouraged mining.

32. Kelly's Gulch or Kelly's Mistake Creek: A little gold was discovered in Kelly's Mistake, but not enough to encourage mining.

33. Middle Fork: Placer mining claims extend from Tramway Bar to Gold Creek along the valley of the Middle Fork. These claims were staked in recent years on the assumption that the Middle Fork is a potential gold dredging propsition. Gold deposited in the Middle Fork Valley near the mouths of Gold Creek, Sheep Creek, Hammond River, Union Creek, Confederate Creek, Wiseman Creek, Emma Creek, Porcupine Creek, and Tramway Bar add credence to this assumption.

34. A coalbed containing 9 to 10 feet of nearly pure coal has been reported to occur near Tramway Bar on the Middle Fork of the Koyukuk River (1, p. 19). The extent of this coal is unknown. Reportedly small amounts were used during the early placer gold operations.

Bettles Quadrangle

The metallogenic zone characterized by copper and gold deposits on the south side of the Brooks Range extends southward into the upper quarter of the Bettles Quadrangle (2, 8, 11). The deposits found in this quadrangle are in this zone.

The area along the pipeline route in this quadrangle contains the following mineral deposits (29):

1. Davis Creek: This creek is about 5 miles long and has thick deposits of washed gravel containing some gold. About $5,000 of placer gold was produced prior to 1909.

2. Ironsides Bar: This is a gold-bearing bench deposit where prospects of gold have been found, but little mining has been done.

3. Gold Bench: This is a high bench deposit of stream gravels rich enough so that $85 to $90 per man-day could be recovered with rockers in the early days. It was mined with heavy equipment in the 1940's.

4. John R. Creek: Gold is reported to have been recovered from 17 holes that were drilled in the creek gravels in 1930.

5. Prospect Creek: Placer gold reportedly was discovered in Prospect Creek, but these reports have not been confirmed.

Beaver Quadrangle

The pipeline corridor will extend a few miles into the southwest corner of the Beaver Quadrangle. No valuable mineral deposits of any type are known in this area.

Tanana Quadrangle

The pipeline corridor will cross the northeast corner of the Tanana Quadrangle, an area where there are no known deposits of valuable minerals.

Livengood Quadrangle

The pipeline route crosses this quadrangle diagonally from the northwest to the southeast. In the northwest corner, the pipeline will cross the Yukon River. In the center it will cross a 10 to 15 mile wide zone characterized by gold placers. In the southeast corner the pipeline route enters the well-known Fairbanks gold mining district (2, 6, 8, 11, 23).

The area along the pipeline route in this quadrangle contains the following mineral deposits (28):

1. Lillian Creek: Gold placers are currently being mined by the bulldozer-sluice-plate system. Claims are current.

2. Cascaden Ridge: A magnetic anomaly of unknown significance in serpentinite is reportedly covered by eleven lode claims.

3. Shorty Creek Copper: Forty-four lode claims were staked during December 1972 and January 1972 to cover a reported copper anomaly.

4. Chatanika River at Dome Creek: This is a deeply buried, perenially frozen gold placer that was drift mined during early days at depths of 200 feet and more. It is covered by patented and unpatented claims.

5. Chatanika River at Vault Creek: This buried, perennially frozen gold placer over 200 feet deep was drift mined in the early days. It is covered by patented and unpatented mining claims.

6. Dome Creek: This is a buried frozen placer 50 to 200 feet deep, partially drift mined. It is now inactive but held by patented and unpatented claims.

7. Vault Creek: This buried frozen placer is about 200 feet in depth, partially drift mined, inactive, and covered by unpatented mining claims.

8. Thrift Mine: Some gold is reported to have been produced from a quartz vein of unknown dimensions and attitude.

8. Fredericks Mine: Brecciated and mineralized schist with an associated granitic dike, rather than a distinct vein, strikes N 70° W, and dips 45° to 70° N. Stibnite and gold are associated with quartz, antimony-arsenic oxides, limonite and calcite. Some stibnite was produced during World Wars I and II, but it is now inactive. Mining claims are unpatented.

8. Gilmer Mine: Auriferous (0.2-0.74 oz Au per ton) massive stibnite in a fracture or shear zone in silvery mica-schist country rock strikes N 70° E, and dips 60° to 70° N. Associate minerals are calcite, argentiferous galena, quartz and antimony-arsenic oxides. It has been intermittently productive, but is idle at present. Lode claims are unpatented.

9. Hoel Bros., Johnson and Witmer Prospect: A low-grade gold quartz vein was developed by a shaft 280 feet deep. No production was reported; claims apparently are abandoned.

10. Treasure Creek: A buried, perennially frozen placer over 200 feet deep from which coarse gold was drift mined from a paystreak ranging from 25 to 225 feet wide and 7 feet thick. It is idle, but covered by unpatented claims.

11. Independence Creek Prospect: A shear zone in schist with sparse stibnite mineralization.

12. Goodwin Mine: Lenses of massive stibnite occur in a shear zone of crushed schist. The zone strikes N 80° E, and dips 45° S. Development and production work done in 1968 and 1969, but it is now idle. Lode claims are unpatented.

12. Treasure Creek Prospect: This gold lode prospect is reported to have been discovered in 1912, but no other information is available.

12. Scrafford Mine: A persistent 3 to 15-foot-wide shear zone cuts quartz-mica schist and contains iron-stained quartz and massive stibnite lodes. The associate minerals are quartz, gold, stibnite, silver-bearing galena, limonite, antimony-arsenic oxides and pyrite. The zone strikes E-W, or West, dips 50° to 70° S. This mine was in production from 1968 through 1970, but idle in 1971. It is covered by unpatented lode claims.

Fairbanks Quadrangle

The proposed pipeline will pass through Federal, State, and private lands including patented and unpatented mining claims and private residential tracts. Only the mineral deposits that are near the pipeline have been enumerated. The pipeline route passes between the principal centers of mineralization (2, 6, 8, 11, 23).

The area near the pipeline route in this quadrangle contains the following mineral deposits (28):

1. Fox Creek: This placer deposit, 6 to 8 feet deep, was worked sporadically by hand methods. Considerable scheelite was recovered with gold near the head of the creek. Claims covering the deposit are considered valid by the claimant.

2. Tanana Prospect: Quartz-scheelite-gold stringers occur in a 3-foot-wide mineralized zone that conforms to quartzite foliation, strikes N 8° W, and dips 60° E.

2. Tungsten Hill Prospect: Scheelite occurs in schist country rock and gold in associated quartz.

2. Blossom Prospect: Pegmatite-type quartz-scheelite stringers penetrate quartz-biotite schist and porphyritic granite.

3. Spruce Hen Prospect: A skarn deposit with scheelite and molybdenite associated with garnet, clinozoisite, diopside, vesuvianite, florite, and calcite that strikes N 50° E, and dips 45° N. Tactite zones strike N 60° E.

3. Columbia Prospect: Decomposed schist containing quartz-scheelite stringers with a porphyritic granite hanging wall strikes N 20° W, and dips 30° E.

The Spruce Hen and Columbia scheelite prospects are covered by unpatented lode claims.

4. Rose Creek Prospect: Tiny veinlets of stibnite in a quartz-feldspar vein strike N 30° E, and dips 70° N.

4. William Brown Prospect: This prospect is near the contact between porphyritic granite and schist.

4. Green Mountain Prospect: A 15-foot-wide quartz vein near a brecciated mass of schist contains sparse gold in quartz.

4. Woodpecker Prospect: Auriferous weathered granite.

5. Steel Creek Prospect: Quartz vein with sparse gold.

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6. Goldstream Creek: A buried, perennially frozen gold placer is adjacent to dredge tailings. There was some drift mining in the area years ago, but recent attempts to develop this deposit were abandoned. The deposit is covered by patented placer claims.

7. Steel Creek: A deeply buried frozen gold placer on which some drift mining in the early days reportedly was not very profitable. The deposit is covered by patented placer claims that are amid a residential area.

8. McGrath Prospect: A gold-quartz vein in schist with no production recorded. This lode claim is amid residential tracts.

Big Delta Quadrangle

The pipeline route crosses diagonally from about the center of the west side of the quadrangle almost to the center of the south side. About midway it passes through a gold-bearing area (2, 26-27). Most of the streams draining a ridge that extends southeast from Redmond Creek about 10 miles to the headwaters of Tenderfoot Creek contain some gold.

The area near the pipeline route in this quadrangle contains the following mineral deposits:

1. Redmond Creek: Some gold was found on Redmond Creek by prospect drilling, but not enough to stimulate mining.

2. Gold Run Creek: Gold prospects were found in Gold Run Creek, but there was no mining.

3. Democrat Creek: A residual gold placer deposit included high-grade gold-bearing quartz that was milled in an arrastra. The upper reaches of the creek were worked by hand; the lower portions by hydraulic methods with a slackline scraper for stacking tailings. Placer and lode claims are unpatented.

4. Buckeye Creek: Frozen, buried gold placers were mined by drifting methods. Hillside (residual?) placers were mined by surface methods, first by hand and later with bulldozers feeding sluiceboxes. Scheelite has been reported in the placer concentrates. Lode and placer claims are unpatented.

5. Banner Creek: A deeply buried, frozen gold placer deposit was mined by underground methods. Some ground is held by unpatented lode claims.

6. Tenderfoot Creek: A deeply buried, frozen gold placer deposit was mined by underground methods. Placer claims are unpatented.

Mt. Hayes Quadrangle

The pipeline route roughly bisects this quadrangle from north to south. In the northern half of the quadrangle the route skirts the Jarvis Creek coalfield, an isolated eastern extension of the Nenana coalfield. The southern half of the quadrangle is in the Wrangell Mountains-Denali copper belt.

The area near the pipeline route in this quadrangle contains the following mineral deposits:

1. Ober Creek: Some fair prospects were reported near the head of the creek during search for placer gold in the early 1900's. Placer claims located in 1929 are reported inactive (19, 22).

1. Savage Creek: This tributary of Ober Creek is said to have produced small amounts of placer gold prior to 1930. Claims located in 1959 are recorded as active (22, 27, p. 34).

2. McCumber Creek: Quartz stringers in schistose rocks northeast of the creek contain galena (19).

3. McCumber Creek: Considerable prospecting for placer gold in early days resulted in little recorded production from McCumber Creek or its tributary, Morningstar Creek. Placer claims located in 1954 are now idle (19, 27, p. 34).

4. Jarvis Creek Coalfield: (30).

(a) Location is 30 miles south of Delta Junction.

(b) The coalfield is about 16 square miles in area.

(c) Reserves have been estimated by the U.S. Geological Survey at 13.4 million tons of subbituminous coal.

(d) The proposed Trans-Alaska Pipeline corridor will include approximately the western third of the coalfield, but the proposed pipeline route does not cross the coalfield; it is on the west side.

(e) An operating mine, the Delta Coal Co., is located within the proposed corridor along Ober Creek. A few hundred tons of coal have been sporadically produced by strip mining for space heating use in the Delta Junction and Fairbanks areas. The proposed pipeline route will cross the mine access road about 3/4 mile from its exit on the Richardson Highway.

(f) During September 1941, the Bureau of Mines drilled 12 relatively short holes (less than 150 feet) in the vicinity of the Delta Coal Co. mine. These holes indicated some continuity of the mine coal seam within stripping depths and also indicated that some coal has been removed by glaciation.

5. Jarvis Creek: Lode claims located for copper in 1954 are considered inactive. Specific location is doubtful.

6. Gunnysack Creek: A short adit was driven on a wide quartz vein in schist prior to 1910. Gold values, initially reported as very high, did not persist (5, 19).

7. Black Rapids Prospect: A small deposit of stibnite associated with quartz in a vein cutting schist was explored prior to 1942. Little other sulfides or gold and silver were detected (9, 20).

8. Miller Creek: Four gold placer claims were recorded in 1954 by the locator (now deceased) of the Emerick copper-nickel prospect.

9. Emerick Copper-Nickel Prospect: On the north slopes of Rainbow Mountain copper and nickel minerals occur in pods up to several feet thick sparsely distributed in serpentinized peridotite over a distance of more than 1,000 feet. Reported pod values are in the range of 2 percent combined copper and nickel, mainly nickel. A composite grade of approximately 0.3 percent nickel has been obtained over long sections excluding pods. Bureau of Mines beneficiation studies to find an economic method of concentrating the nickel were unsuccessful. The Bee prospect, geogically similar, lies 3 miles west across the Delta River. Traces of nickel, gold, silver, and base metal sulfides are widely distributed in the Rainbow Mountain area. The prospect is covered by active unpatented claims (10, 24, 28).

Glacier Lake Prospect: One mile east of the Emerick prospect nickel-copper sulfide minerals are reported with higher values in a narrow zone between diorite and peridotite. This prospect is covered by active claims.

10. Last Chance Creek: Located in 1954 for placer gold, four or five claims are reportedly active.

11. Rainbow, Eastern Star, and Pioneer: Light-colored gabbro with disseminated chalcopyrite is exposed in a series of pits. A random chip sample assayed 1 percent copper, 0.01 oz gold, and 0.22 oz silver per ton. Located in 1953, this property is considered active (24).

12. Rainy Creek: Gold placers were worked sporadically between 1900 and 1930, but apparently were not very profitable. Placer claims recorded in 1900 and 1925 are reported to be inactive (22, 24).

13. Copter Lode: Copper was reported on the right limit of Rainy Creek in 1956. The position is vague, but it may be the prospect noted in the references as large, but of low grade, in copper, with a little gold (3, 13).

14. Clay Deposit: Locations for "limestone and montmorillonite" were recorded in 1965. This may be a previously worked clay deposit reported by Bureau of Mines engineers in 1963 near limestone outcrops (28).

15. Delta River: Gold was panned from gravels of the Delta River in this vicinity in 1910 (16).

16. Dan Creek(?): Gold placer claims were recorded in 1953 and are reported currently active. The location is questionable.

17. Savage Prospect: Copper sulfides occur in and adjacent to veins and pods of quartz and epidote in chloritic vesicular basalt. Veins and pods generally less than 1 inch thick are exposed in pits and in the road cut. Three claims located in 1953 apparently are inactive (25, pp. 11-12).

18. Copper Mineralization: A small exposure of vesicular basalt contains chalcocite and chrysocolla in a steep gulch (13, 25, pp. 11-12).

Gulkana Quadrangle

Mineral prospecting has been directed principally to the Wrangell Mountains-Denali copper belt in the northern part of the quadrangle. Deposits include an inactive gold placer on Excelsior Creek, and numerous copper-gold prospects on Hogan Hill. The copper deposits on Hogal Hill were discovered many years ago; then rediscovered during the operation of small quarrys that were used to supply crushed rock for road construction. No mineral production has been recorded except from gravel pits and rock quarrys.

There are nine oil leases in or adjacent to the corridor in the southern half of the quadrangle. A plugged water and gas well 160 feet deep containing gas at 40 psi is near the south side of the quadrangle.

The area near the pipeline route in this quadrangle contains the following mineral deposits, oil and gas leases, and a gas show:

1. Traces of chalcopyrite occur with magnetite in greenschist and diorite about ¼ mile northwest of Meiers Lake. The magnetite occurs in irregular pods up to 1 inch wide and a few inches long (12, 25, pp. 13-14).

2. Hogan Hill: Pyrite and traces of chalcopyrite occur in fractures in biotite granodiorite in a quarry near the north end of Hogan Hill (25).

3. Hogan Hill: Small chalcopyrite-quartz veins are locally present in schist in a quarry near the north end of Hogan Hill. Minor copper stain also is present near the south end of Hogan Hill (25).

4. Excelsior Creek: Placer gold was first discovered on Excelsior Creek about 1900. Production, if any, was probably minor and records are not available. There is no record of recent assessment work (15).

5. Hogan Hill: Traces of copper minerals occur in greenstone (possibly with traces of silver) on or near a greenstone-diorite contact. There are many old gold prospect pits in the area (12, 25, pp. 11-12).

6. Hogan Hill: Copper minerals in greenstone probably located between deposits 2 and 3 (12, 25, pp. 11-12).

7. Gas Well: A capped water well with a gas pressure of 40 psi at 160 feet is near mile 185, Glenn Highway.

8-16. Oil and Gas Leases: The approximate location of leases held when the report was written is shown. Exploration in the area has included geologic mapping, seismic and other geophysical surveys, and some drilling. Results are not available.

Valdez Quadrangle

The pipeline route follows the Richardson Highway. The relative abundance of claims probably results largely from ready accessibility. This highway has been an important means of access to interior Alaska since the early 1900's. Most of the deposits have been known for many years (2, 17, 18). Despite the favorable location, none of the prospects have developed into important producers.

The area near the pipeline route in this quadrangle contains the following mineral deposits and gas show:

1. Willow Mountain: Chalcopyrite, malachite, and hydrozincite are sparsely distributed in sheared, brecciated and hydrothermally altered limestone. Nine lode claims were located in 1956. Values in copper, gold, and zinc have been reported by the locators.

2. Tonsina: A gas show was reported at a depth of 60 feet in a water well. The well is currently producing water and gas. It will be sampled by the Bureau of Mines.

3. Bernard Mountain: Layers, lenses, and disseminated grains of chromite occur at several localities in a dunite intrusive about 1.3 miles wide and 2.2 miles long. Various known layers range from a few feet up to 50 feet in width and contain from 5 to 32 percent chromite. Table concentrates from a composite of cut samples contained 48 percent Cr_2O_3, with a chromium-to-iron ratio of 2.7 to 1.0. Similar deposits occur in dunite on Sheep and Dust Mountains about 4 miles and 7 miles, respectively, to the east-northeast. Eighty-one unpatented claims have been held by location and current annual assessment work on Bernard Mountain. Exploration work includes geologic mapping, geophysical and geochemical surveys, trenching, stripping, and sampling.

4. Quartz Creek Placers: A small production of gold was reported in 1898 and 1899, with limited later activity.

5. Fourth of July Creek: A small amount of placer gold was produced during exploration work on this property in 1929 and 1930.

6. Quartz Creek Gold Mining Co.: Quartz veins from 1 to 2 feet wide carry gold, galena, chalcopyrite, arsenopyrite, and pyrite. The veins occur in schist, slate and graywacke intruded by numerous dikes of diorite porphyry. A group of 37 lode claims and a millsite were located before 1916. Exploration consisted of open cuts and two adits, 65 feet and 175 feet long, respectively. Six claims were patented in 1926.

7. Hurtle Creek: Early placer exploration was recorded, but there was no significant gold production.

8. Ernestine Creek: The placers were explored in the period from 1898 to 1900, but no economic gold production was recorded.

9. Fall Creek, #5 Claim area: Placer gold was discovered in 1898, and there was some small-scale production until 1916 or later. The gold was coarse and worn, on bedrock only, and covered by 6 to 8 feet of boulders and gravel in a generally narrow channel, at stream bends.

10. Fall Creek, #10 Claim area: A small amount of coarse, rounded gold was produced from channel and low bench workings. The shallow overburden is mostly boulders.

11. Wetzler Mine: Numerous narrow quartz veins range from stringers to 18 inches wide in slate and graywacke. The country rock is cut by dioritic dikes. The north-trending veins dip about 60 degrees easterly. Spotty, often high-grade gold values are accompanied by galena, chalcopyrite, sphalerite, and arsenopyrite. Exploration consists of numerous open cuts, and underground work in adits on two of the veins. Earlier gold production was from a water-powered arrastre and from 3 tons of ore shipped to the Tacoma smelter. The original 10-claim Quail group was relocated as the Wetzler group in 1959 and annual assessment work has been recorded each year through 1971.

12. Telluride Prospect: An old nine-claim group of lode claims cover narrow quartz veins in slate and graywacke just southeast of the Wetzler group. Exploration apparently was limited.

13. Boulder Creek: Old gold placer workings are evident on this creek, but no description of deposits or record of production is available.

14. Eagle Mine: This group of claims was relocated in 1926 as the Ellis claims. Several quartz veins up to 6 feet thick are emplaced in slate and graywacke intruded by porphyry dikes. The productive veins strike northerly and are almost vertical. Minerals include gold, galena, and arsenopyrite. Gold has been produced from small, high-grade bunches of oxidized ore amalgamated in an arrastre or shipped to the mill at the Cliff mine, west of Valdez.

15. Knowles Prospect: Lenticular quartz veins 10 to 14 inches wide containing gold, galena, and pyrite are emplaced in slate and graywacke. The richest strike north to northeasterly and dip steeply to the east or southeast. Exploration has been by opencuts.

16. Ross Prospect: A quartz vein carrying gold, galena, and arsenopyrite in a slate country rock was explored with about 200 feet of adit drift. High assays in gold were reported, but their distribution in the vein was decidedly "bunchy."

17. Portland Prospect: Gold-bearing quartz beins on the mountain a short distance west of Tiekel were located before 1916. No other information is known.

18. Reis Prospect: Claims located before 1916 by Frank Reis on auriferous quartz veins about 3 miles south of Tiekel.

19-32. Radioactive mineral locations near Tiekel in 1955: Reports by prospectors of radioactivity in this area resulted in the following list of recordings. The U.S. Geological Survey made a reconnaissance survey for uranium in the area later in 1955 (14, 21). They did not find indications of probable economic deposits. One locator filed annual assessment work affidavits for 1956 and 1957. Bedrock is mostly contorted slaty, graphitic graywacke of Cretaceous age cut by numerous quartz veins and by dikes and sills of diorite porphyry.

19. B.L.R.#1-#4: Mile 54.7, Richardson Highway.

20. 2 Above Bench: Mile 55, Richardson Highway.

21. Bessie B.: Mile 55, Richardson Highway.

22. Chester E. Bunsek: Mile 55, Richardson Highway.

23. C.C. & L.: Mile 54, Richardson Highway.

24. Mary Huddleson: Mile 55, Richardson Highway.

25. Huddleson: Mile 55, Richardson Highway.

26. 3 Trays; Friday 13th; Triangle: Mile 54.625 Richardson Highway.

27. Johnson: Mile 53.8, Richardson Highway.

28. Matheson: Mile 53.65, Richardson Highway.

29. Lind: Mile 53.5, Richardson Highway.

30. Rabbitt Foot Lode: Near Tiekel, Richardson Highway.

31. Pontiac Mining Corp. #2: Mile 49.3, Richardson Highway.

32. Pontiac Mining Corp. #1: Mile 49.2, Richardson Highway.

33. Townsend and Holland Prospect: Gold-bearing quartz veins occur in sheared, crinkly slate. Two of the veins are explored by adits that start just south of the highway and run under it. The east adit is driven about N 60° E on a quartz vein from 3 to 5 feet wide. This adit is connected to the surface by a raise that surfaces about 75 feet north of the highway. The west adit is about 150 feet long on a 1-foot vein striking N 40° E.

34. McKinley Stone Co. Claim No. 5: This claim was located for building stone in 1954.

35. Little Feller: This was located for gold in 1953 and 1955, and annual work affidavits were recorded in 1955.

36. Barry & Simpson Prospect: Four claims located for copper and gold in 1965 near Thompson Pass. Annual work affidavits have been recorded through the year 1971.

37. Saint Bernadette: A group of three claims were located in 1955 for marble near mile 23, Richardson Highway.

38. Lowe River: Placer gold claims were located along about 6 miles of river above Keystone Canyon before 1915. After considerable exploratory churn drilling was done, the property was considered unsuited for large-scale mining. Some minor production has been reported.

39. Addison Powell Prospect: This is reported to be a large, low-grade copper prospect containing chalcopyrite, with a little malachite and some gold. Exploration is said to consist of about 150 feet of opencutting and stripping and 100 feet of underground work. The actual position of the deposit and the working is in doubt. The prospect may be some distance east or west of the mapped position.

40. Noble Minerals Prospect: Two placer claims were located at the mouth of Mineral Creek in 1953. The lower part of Mineral Creek valley was actively explored for placer gold from about 1913 to 1915, but no economic mining operations resulted.

41. Golden and Happy Days Prospect: Gold lode claims described as "2 miles southwest of Dayville Dock" were located in 1954. The actual location is uncertain; they may be a relocation of the old Patten prospect. (see No. 42, below.)

42. Patten Mining Co. Prospect: Gold-bearing veins were under active exploration in 1917; an adit, reported to be 160 feet long, was driven and other work accomplished. The prospect is described as "near Swanport." This was an early day settlement about 2 miles west of Fort Liscum.

43. Solomon Gulch: The gold placers were explored before 1914 but were not mined on a significant scale.

44. Midas Mine: Sheared and brecciated zones are in late Cretaceous slate and graywacke near an intrusive greenstone body. Chalcopyrite, pyrite, pyrrhotite, and sphalerite occurring as replacements and disseminations characterize the Jumbo and All American lodes. The Jumbo lode was developed by adits and other underground workings on four levels, interconnected with raises. A shaft was sunk to a depth of 200 feet below the lowest, or No. 4 haulage adit. Regular shipments of mine-run and hand-sorted copper ore were mined underground from deposits ranging from 1 to 20 feet wide from 1914 through 1919. Reports state that the mine shut down in 1920 because of the impossibility of obtaining ships to transport ore to the smelter. The aerial tramway, diesel power plant, and other facilities have been removed and the shipping bunker and dock at tidewater have been dismantled. These deposits are covered by a block of 15 patented lode claims. There are also two patented mill sites.

45. Bayview Prospect: A copper-bearing mineralized zone occurs in a large greenstone area that crosses the head of Solomon Gulch about 1½ miles south of the Midas mine.

46. Kenney Lake: This 14-claim gold prospect was located in 1969.

47. Luck One Prospect: This prospect was located for gold in 1956.

48. Phillip Group: An eight-claim gold prospect was located in 1969.

49. P. J. Group: Sixteen claims were located for gold in 1969.

50. O'Brien Creek: Three claims were located in 1953 and 1961. Annual work affidavits are recorded through 1971.

51. Porcupine Prospect: Six claims were located for gold and silver in 1969 and 1970. Annual work affidavits were recorded in 1971. The Bald Eagle Nos. 1 and 2 were located for molybdenum, copper, and tungsten in 1970.

52. Randolph Prospect: Two claims were located close to the old Eagle gold mine in 1971.

53. Guardian Prospect: A gold lode claim was located in 1968. Annual work recordings are current through 1971.

54. Hi-Lo Prospect: Three claims were located for gold in 1971.

55. Red Eye Prospect: One claim was located for gold in 1971.

56. Wortman Creek: Fifteen claims were located in 1966. This group is believed to be a gold placer.

57. Black Bear Prospect: Four claims were located in 1956 for platinum.

58. Yellow Bar: This area was located for gold in 1953.

59. Jackson Point: Five gold claim locations were recorded in 1971.

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