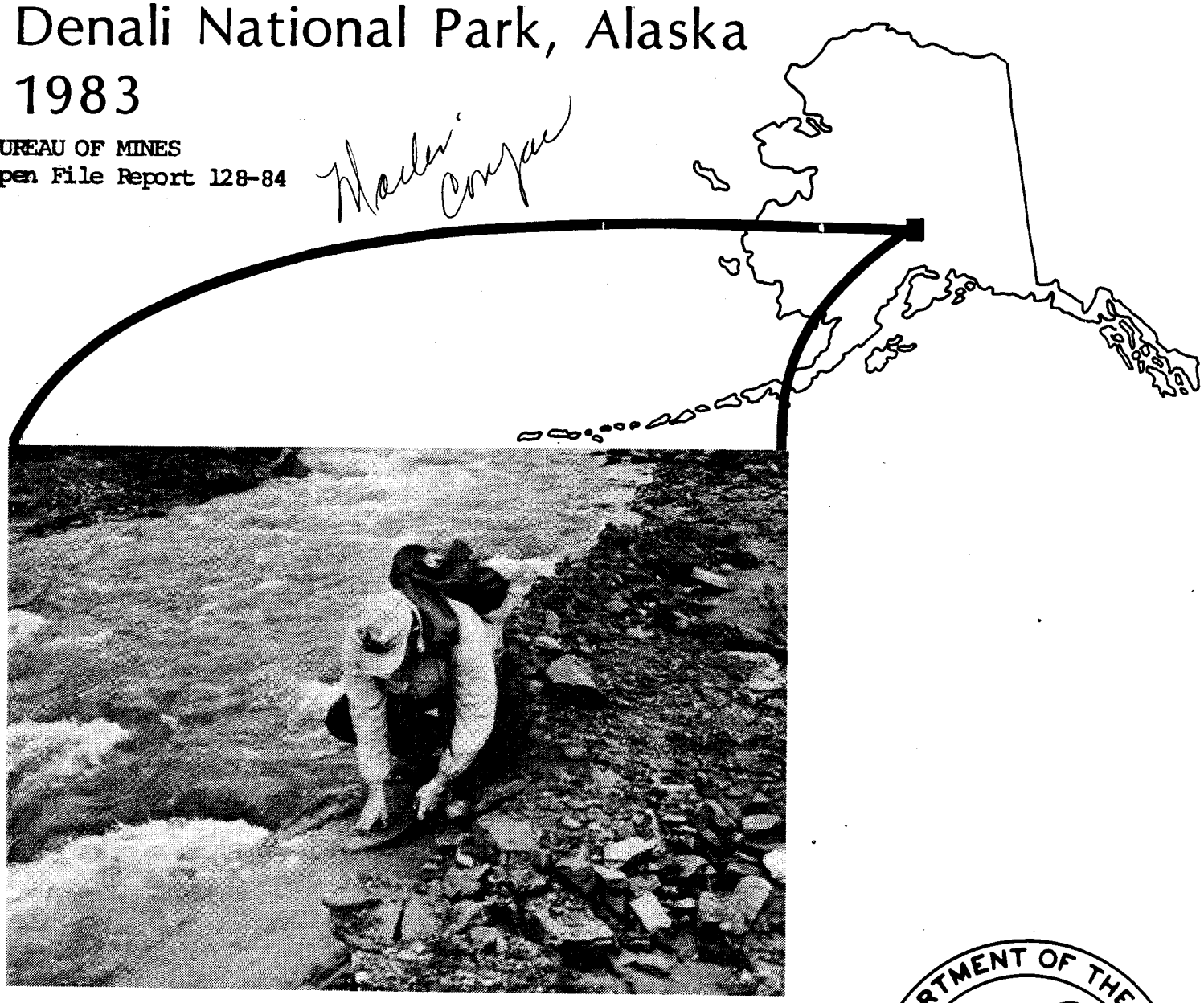
MINING PROPERTIES ACQUISITION COSTS

Kantishna Hills and Dunkle Mine Study Area, Denali National Park, Alaska 1983

BUREAU OF MINES
Open File Report 128-84



Prepared under
BUREAU of MINES CONTRACT # S0134043
By

DOWL ENGINEERS / PLANGRAPHICS, INC.

For the ALASKA LAND USE COUNCIL

JANUARY, 1984

April 25, 1984
W.O. #D50781

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Attention: James Paone, 500
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Gentlemen:

Enclosed with this transmittal letter is DOWL/PLANgraphics final report estimating the present cost of acquiring all mineral property interests in the Kantishna Hills and Dunkle Mine study areas of the Denali National Park and Preserve.

As anticipated during our contract negotiations with the Bureau of Mines, the constraints on this analysis were related to budgetary limitations on the field investigation, the lack of time between completion of the Bureau's 1983 field investigations and the due date for the draft report, the paucity of information made available for patented lode claims (a significant number of lode claims were either not

drilled during the 1983 program or the cores were not recovered), and budgetary limitations on the manhours available for subsequent analysis following the 1983 field season.

In addition to the tasks originally contemplated by the contractual scope of work, it should also be noted that project personnel were requested by the Bureau to participate in several meetings in Anchorage and one in Spokane, Washington.

On the positive side, the above noted constraints were somewhat offset by the excellent cooperation of the local Bureau staff, and in particular, Bob Hoekzema, the Government Technical Project Officer (Uldis Jansons) and Bureau contract personnel both in the field and in the office (Anchorage and Spokane). Without this cooperation, completion of the draft report in a timely manner would have proven physically impossible. The rapid response of the Bureau following the submission of the draft report was partially gratifying and the input received in no small measure assisted DOWL/PLANgraphics in preparing the final report and providing the input required for the December 9, 1983 meeting of the Alaska Land Use Council.

DOWL Engineers, PLANgraphics, Inc., and the Wakeland Company have certainly been pleased to provide this service to the Bureau and feel that the estimates provided are adequate to provide the Bureau and the Land Use Council with the perspective necessary to consider various alternatives for recommendation to the Congress as required under Section 202 of the Alaska National Interest Lands Conservation Act of 1980.

While many of the editorial changes to the draft report suggested by Bureau personnel have been incorporated in this final report, it should be noted that not all of the suggested changes were made since some of these would have been inconsistent with our report format. This final report, however, is in accordance with the format provided in Appendix C of the contract. A file folder for each claim or group of claims examined is being provided under separate cover to the Anchorage office of the Bureau. Appropriate annotated photographic documentation is included with these file folders.

This transmittal letter also serves as DOWL/PLANgraphics' certification that we have carefully examined the subject areas and the existing mineral rights within their boundaries (subject only to the previously noted constraints); that we have attributed dollar values to such areas which represent our best unbiased opinion as to the estimated cost of acquiring the outstanding mineral interests; that we have no

present or intended future interest in any of the area examined; and that we have delivered the final report and are providing under separate cover all field notes and research data developed by DOWL in preparing the report. While it is understood that these delivered materials have the status of confidential information and that no part of this information is to be discussed with or divulged to any person outside of the Interior Department or the Alaska Land Use Council, file copies of the report are being maintained by DOWL and its associates in this study effort.

This letter also serves as DOWL/PLANgraphics' certification as to the absence of any material generated by this study effort that would fall under Appendix B - Patents and Inventions Article of the subject contract with the Bureau.

It should be noted that our field examination and subsequent analysis was based on Alternative 2 of the Department of Interiors Draft Environmental Impact Statement which addressed the expeditious acquisition of all patented and assumed valid unpatented mining claims. Under this alternative, the approximately 160 lode claims (NIM) indicated on the August 1981 West Fork Mining Claims map (NPS, September 1981) were not included in the present study effort.

Again, it has been DOWL/PLANgraphics' pleasure to provide this service to the Bureau. We would certainly look forward to any opportunity to provide additional services to the Bureau in the future.

Sincerely yours,

DOWL ENGINEERS

John E. Paulson, Partner
DOWL Engineers

John C. Antenucci
PLANgraphics, Inc.

JEP:JCA:rb

Enclosure: Final Report

MINING PROPERTIES ACQUISITION COSTS: KANTISHNA HILLS AND DUNKLE MINE STUDY AREAS, DENALI NATIONAL PARK, ALASKA

January, 1984

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ABSTRACT

This project was undertaken by DOWL Engineers and PLAN-graphics, Inc. under contract to the U.S. Bureau of Mines. The scope of work focused on estimating the present cost of acquiring mining properties in the Kantishna Hills and Dunkle Mine study area of Denali National Park and Preserve, Southcentral, Alaska. This work was undertaken to partially fulfill a statutory requirement of Section 202(3)(b) of the 1980 Alaska National Interest Lands Conservation Act (ANILCA).

This report describes the methodology and results of estimating the overall mineral resource value and the present cost of acquiring mineral property interests in the Kantishna Hills and Dunkle Mine study areas of Denali National Park and Preserve, Southcentral, Alaska. Previous studies have underestimated the value of acquiring these properties. The cost of acquiring both placer and lode claims based on current market value is estimated to be some 157.2 million dollars. This acquisition cost includes the value of the patented surface estate.

FOREWARD

This project was undertaken by DOWL Engineers and PLAN-graphics, Inc. under contract to the U.S. Bureau of Mines. The scope of work focused on estimating the present cost of acquiring mining properties in the Kantishna Hills and Dunkle Mine study area of Denali National Park and Preserve, South-central, Alaska. This work was undertaken to partially fulfill a statutory requirement of Section 202(3)(b) of the 1980 Alaska National Interest Lands Conservation Act (ANILCA).

This particular phase of the work provides the Alaska Land Use Council with the estimated cost of acquiring mining properties as well as establishes an overall mineral resource value. Other studies have previously focused on the potential mineral value of the area or have attempted to estimate the value of selected claims. This study provides the first systematic approach to an overall evaluation. Time limitation or constraints of available funding levels set the level of fall field activity and the paucity of subsurface data on patented lode claims required alternative methodologies to be undertaken.

The total estimated market value of 233 claims under consideration in this study is about 157.2 million dollars, a value far in excess of any previous estimates but a value which is believed to represent a conservative estimate. Of this total market value, nearly $63 million is in placer claims, $94 million in lode claims, and over $750 thousand in the patented surface estate. This value is far in excess (by orders of magnitude) of the value used by the National Park

Service in the preparation of its Draft Environmental Impact Statement (1983). Less than 1% of the market value is in the Dunkle Mine study area.

It should be noted that the present study evaluated only the market value of claims currently considered valid within the study area. No consideration was given to the potential mineral value of other lands within the Kantishna study area.

It appears that much of the mining activity in the Kantishna Hills area could operate in an economically viable manner at current mineral values and while meeting existing environmental standards. Several of the smaller placer operations may be able to survive under these conditions.

Nearly all other alternatives considered in the Draft Environmental Impact Statement require the further expenditure of public dollars for additional mineral evaluation. For example, it is estimated that the cost of completing a mineral evaluation of the existing claims within the study area is on the order of 16 to 20 million dollars.

ACKNOWLEDGMENTS

This DOWL/PLANgraphics report for the U.S. Bureau of Mines was prepared under the overall direction of DOWL partner John E. Paulson. The principal authorship rests with DOWL Director of Environmental Services, Ronald R. Dagon and PLANgraphics principal, John Antenucci. Mining engineer Dan Jones and geologist Bob Sanders conducted the field investigation and developed the analysis of both lode and placer inferred resources of the study area. Tim Lowe of the Wakeland Company, accompanied by Jones, conducted the field appraisal of the surface estate and developed the actual appraisal values. Bruce Silva of Silva Demographics assisted in the market survey. Corey Loyd and Kurt Egelhoffer of the DOWL staff performed most of the data reduction and calculations required for completion of the study. The cooperation of the Bureau's Alaskan staff and the Salisbury & Dietz, Inc. personnel and contractors during the course of the field investigation is gratefully acknowledged.

ABBREVIATIONS OF UNITS OF MEASURE

BCY = bank cubic yard(s)

cy = cubic yard(s)

ft = foot, feet

lb = pound

MBCY = thousands of bulk (or bank) cubic yards

oz = ounce

oz/BCY= ounces per bank cubic yard

oz/cy = ounces per cubic yard

T = ton

% = percent

$/BCY = dollars per bank cubic yard

$/T = dollars per ton

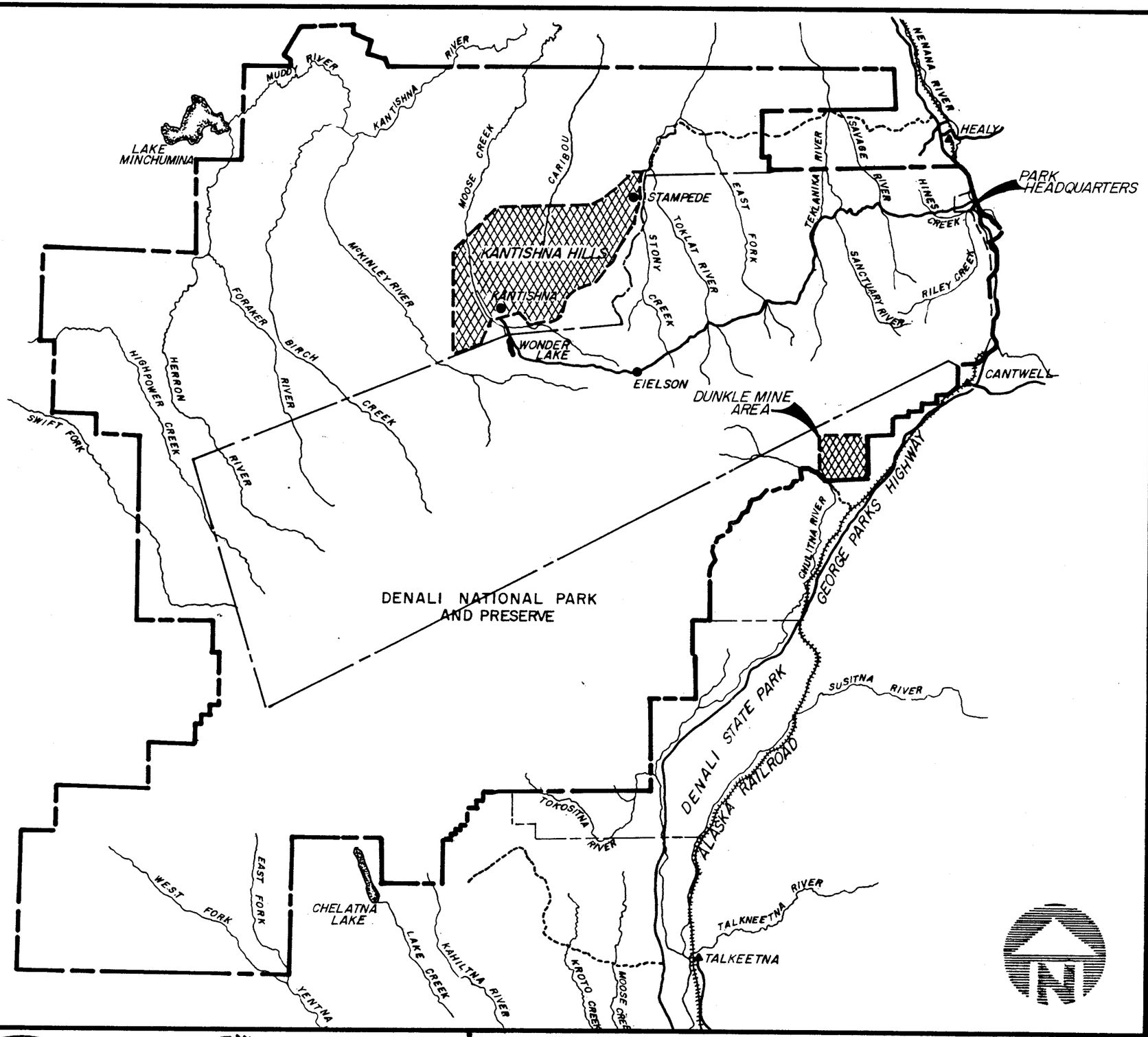
$/troy oz = dollars per troy ounce

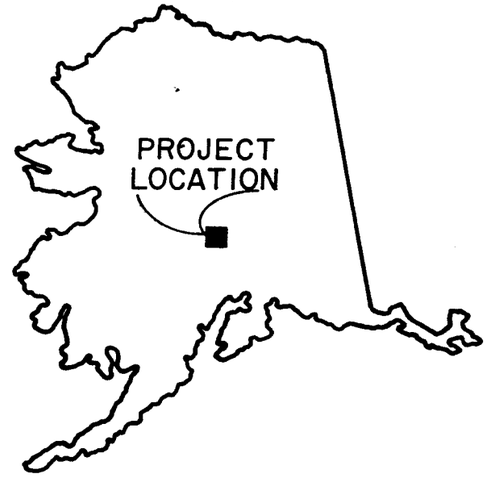
INTRODUCTION

In December 1980, the United States Congress passed Public Law 96-487, the Alaska National Interest Lands Conservation Act (ANILCA). Section 202(3)(b) of the Act directed the Alaska Land Use Council, in cooperation with the Secretary of the Interior, to conduct a study and prepare a report with recommendations to Congress concerning specific resources in the Kantishna Hills and Dunkle Mine areas of Denali National Park and Preserve, Alaska. The statute states in part "...In consultation with the study required by this section, the Council, in consultation with the Secretary, shall compile information relating to the mineral potential of the areas encompassed within the study, the estimated cost of acquiring mining properties, and the environmental consequences of further mineral development."

The U.S. Department of the Interior, Bureau of Mines (Bureau), acting as a member of the Kantishna Hills/Dunkle Mine Study group of the Alaska Land Use Council has undertaken a reconnaissance level field assessment of the minerals and mining properties of the Kantishna Hills and Dunkle Mine study areas (figure 1). This effort included a limited drilling program of mineralized areas in Kantishna Hills, and an estimation of the mineral values in both study areas.

Specifically, this report describes the methodology and results of estimating the present cost of acquiring mineral property interests in the Kantishna Hills and Dunkle Mine study areas. The scope of work leading to this estimation reflects provisions of the Bureau's Request for Proposals No. J0134043 dated July 1, 1983 and the Technical Proposal





EXPLANATION

- PARK (ORIGINAL)
- PRESERVE (D-2)
- STUDY AREA(S)

0 1 2 3 KILOMETERS
0 1 2 MILES
SCALE: 0.6" = 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC.

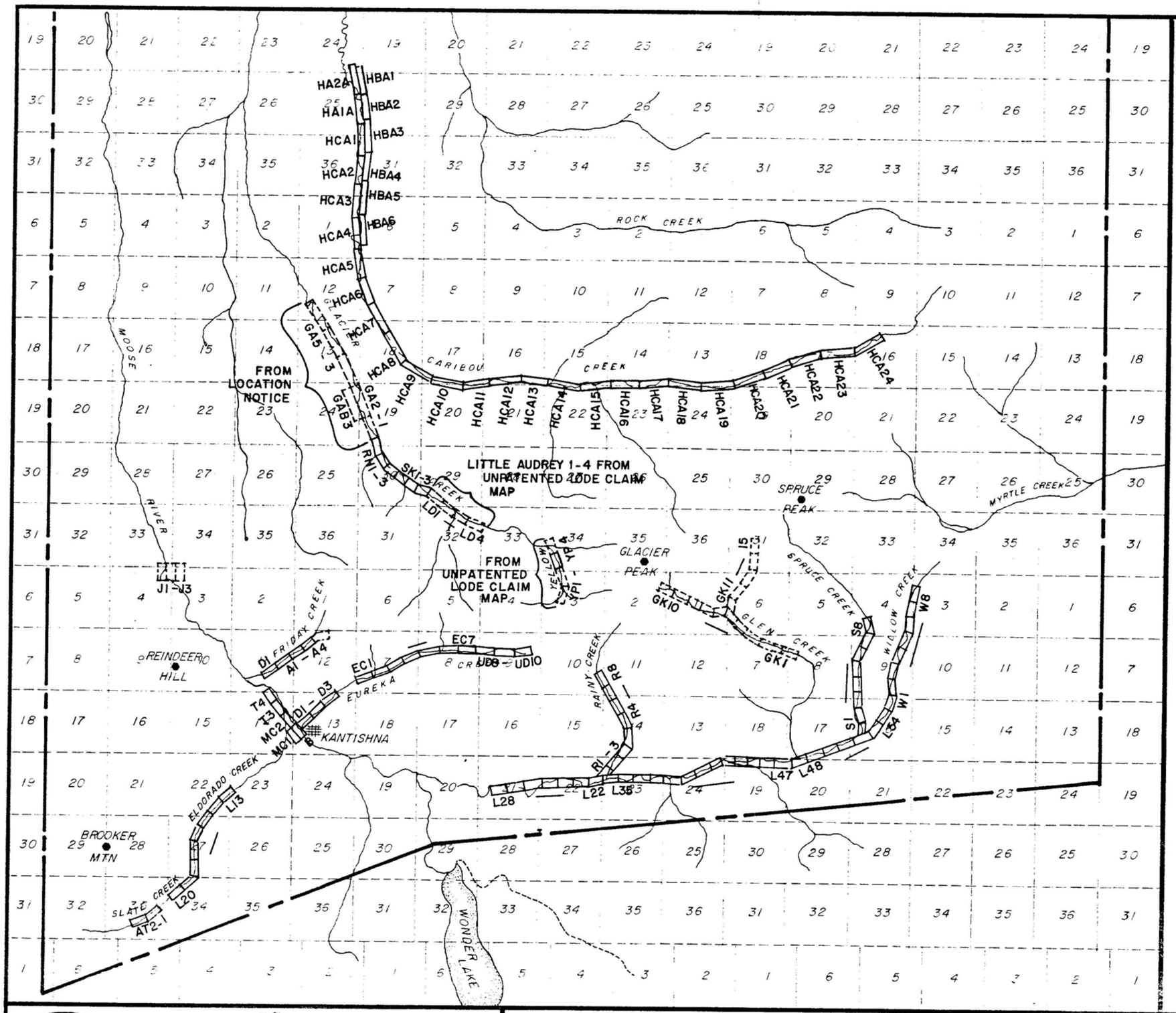
Figure 1 LOCATION MAP of KANTISHNA HILLS and DUNKLE MINE STUDY AREAS

submitted by DOWL Engineers/PLANgraphics on July 25, 1983, as amended by letter dated August 4, 1983. A contract resulting from the Request for Proposal and the DOWL/PLANgraphics Technical Proposal was culminated on September 26th, subsequent to an August 10th Notice to Proceed.

GENERAL REQUIREMENTS

Generally the scope of work requires an investigation of selected mining properties in the study area by trained and experienced geologists and/or mining engineers. The investigation included 224 claims in the Kantishna study area: 185 unpatented placers, 5 unpatented lodes and 34 patented lodes. There are also 9 unpatented placers in the Dunkle Mine study area (figures 2, 3, and 4).

The estimates are to be based on all available data including: non-confidential data of the Bureau of Mines, Alaska Field Operations Center, Anchorage office; the preliminary results of a 1983 field season drilling program by Salisbury & Dietz, Inc.; and the preliminary results of a regional placer sampling program by the Bureau. A field reconnaissance was undertaken and complete documentation of the field appraisals are provided in this report. The Bureau specifically excluded additional geological, geophysical and geochemical investigations from the scope of this effort. Other significant factors in the general scope of services as agreed between DOWL/PLANgraphics and the Bureau included:



EXPLANATION

NATIONAL PARK SERVICE ABBREVIATION AND NAME:

- L = LIBERTY
- R = RAINY
- GK = GOLD KING
- GC = GLEN CREEK
- EC = EUREKA CREEK
- D = DISCOVERY
- UD = UPPER DISCOVERY
- GA = GLACIER ASSOCIATION
- RH = RED HAT
- A = ALDER
- T = TAYBO
- MC = MOOSE
- B = BUENO
- J = JAUHOLA
- S = SPRUCE
- W = WILLOW
- SK = SCHMUCK
- HBA = LEE BENCH HOWTAY ASSOCIATION
- HA = HOWTAY ASSOCIATION
- HCA = CARIBOU-HOWTAY ASSOCIATION
- GB = GLACIER ASSOCIATION BENCH
- C = CHINOOK
- AT = ANTIMONY
- SR = SHAMROCK
- YP = YELLOW PUP
- DI = DISCOVERY CLAIM FRIDAY CREEK
- LD = LITTLE AUDREY

RECORDED CLAIMS

RECORDED CLAIMS-RELOCATED, APPARENT MISPLACEMENT IN DENALI EIS

ENVIRONMENTAL OVERVIEW STUDY AREA BOUNDARY, 1981

NOTE: CLAIM AREAS ARE ONLY APPROXIMATE

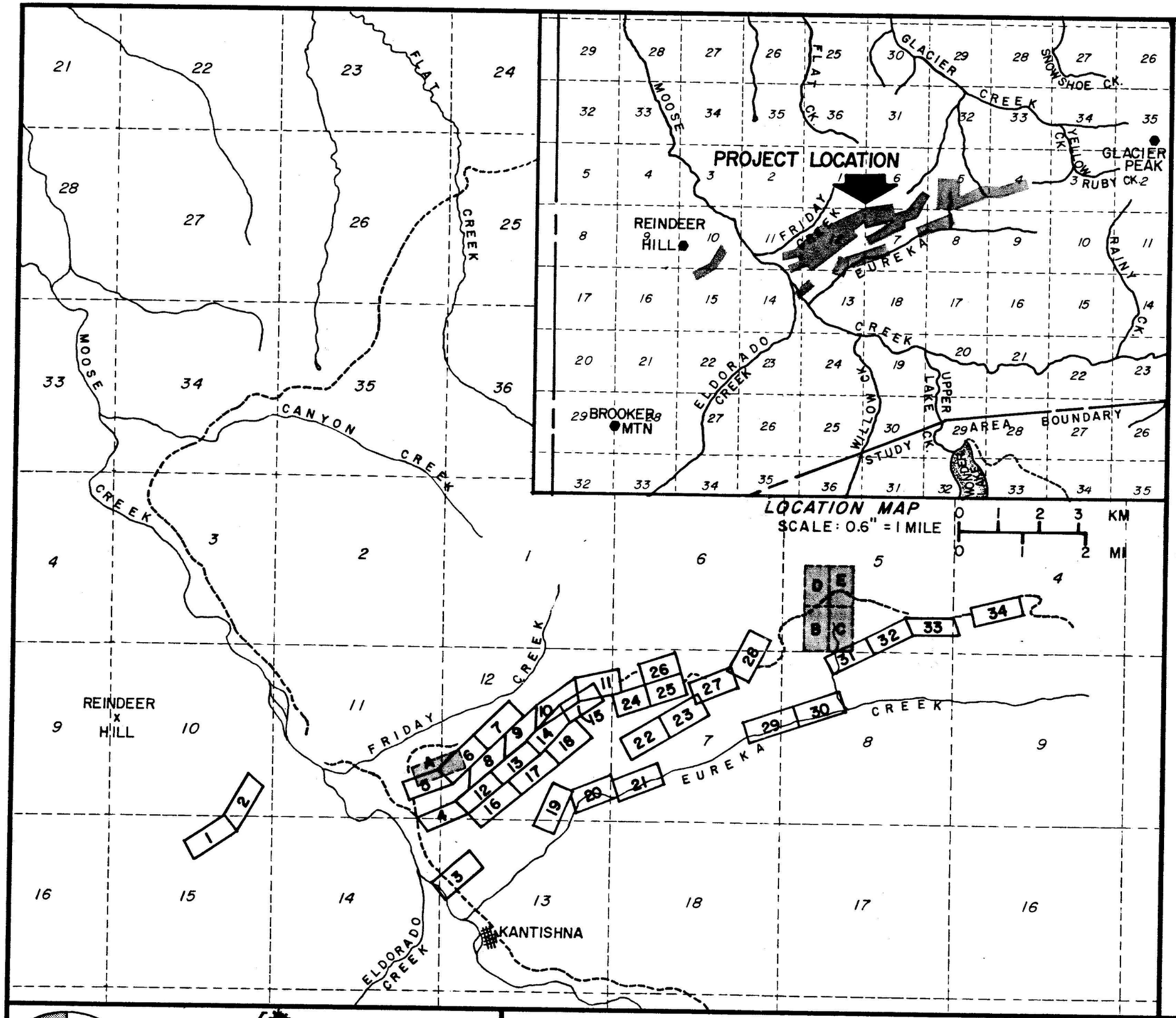
0 1 2 3 KILOMETERS

0 1 2 MILES

SCALE: 0.6" = 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC.

Figure 2 KANTISHNA HILLS STUDY AREA PLACER CLAIMS



EXPLANATION

NATIONAL PARK SERVICE ABBREVIATION & NAME

1 = Whistler
2 = Bright Light
3 = Lucky Strike
4 = Galena
5 = Red Top
6 = Star
7 = Friday
8 = Martha Q
9 = Polly Wonder
10 = Gold Dollar
11 = Golden Eagle
12 = Francis
13 = Little Dipper
14 = Little Annie
15 = Little Annie # 2
16 = Silver Pick # 2
17 = Silver Pick
18 = Darling
19 = White Hawk
20 = Water Level
21 = Sulfide
22 = Keystone
23 = Pennsylvania
24 = Gold King
25 = East Gold King
26 = Blue Bell
27 = Pittsburg
28 = Doherty
29 = Merry Widow
30 = Silver King
31 = Jupiter - Mars
32 = Chloride
33 = Waterloo
34 = Chlorine
A = Red
B = Banjo
C = Hardrock
D = Pass
E = Tugboat Annie

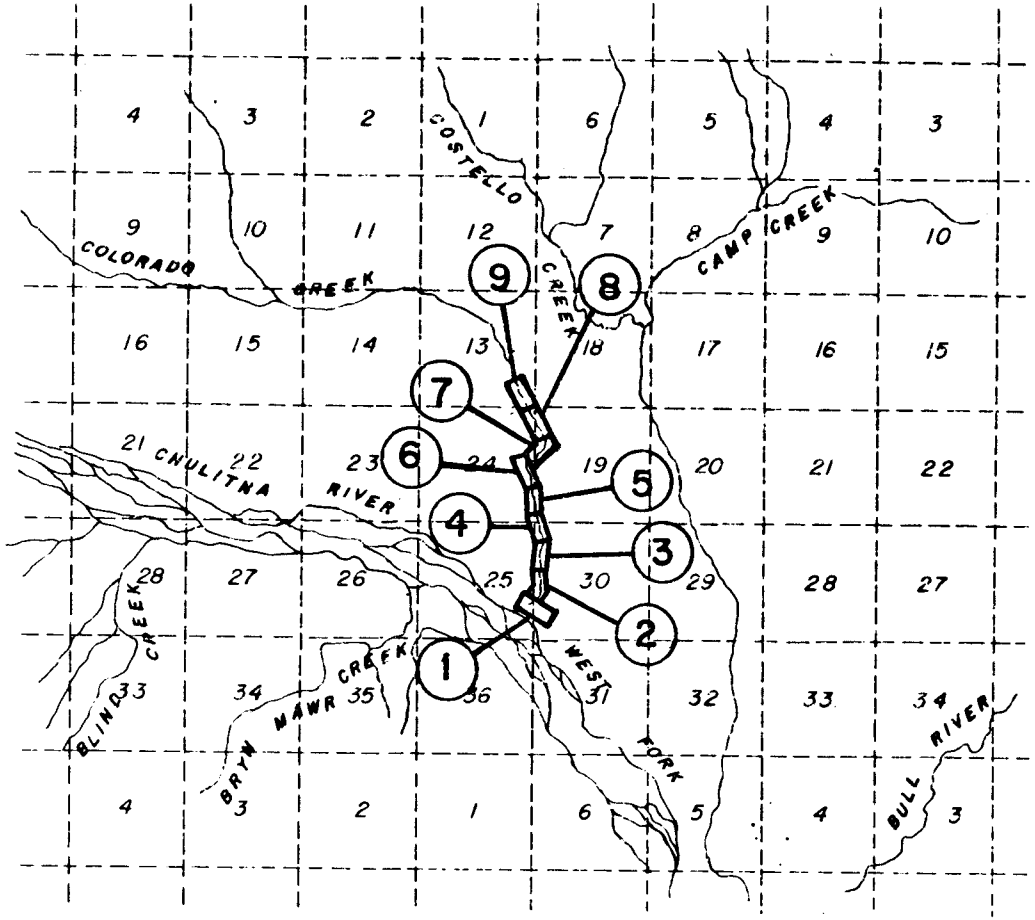
Patented Claims

Unpatented Claims

SCALE: 1.7" = 1 MILE
0 1 KILOMETER
0 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC

Figure 3 KANTISHNA HILLS STUDY AREA LODE CLAIMS



EXPLANATION

COLORADO CREEK PLACERS

Placer Claim

(1) National Park Service Reference Number

0 1 2 3 KILOMETERS

0 1 2 MILES

SCALE : 0.6" = 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC.

Figure 4 **DUNKLE MINE STUDY AREA MINING CLAIMS**

- Estimates of the costs of acquiring mineral property ownership; 1) separately as operating units, 2) collectively as ownership or development groups, and 3) totally, as a range of costs for each study area.

- Estimates of the cost of acquiring the ownership of patented claims including the value of the surface estate.

- A limitation to 30 labor days of effort for site review and appraisal due to funding constraints.

- Estimates of the cost of acquiring mineral property ownerships would be developed by special and abbreviated appraisal techniques, be fully documented, and be the estimated fair market value if the area remained open to mineral entry.

- A final report providing complete documentation of the methodology and results of estimating the cost of acquiring mineral property interests in the study area. The final report is to include recommendations and conclusions based on experience and results obtained from field observations and subsequent analysis.

SPECIFIC WORK PROGRAM

The detailed scope relied on a closely coordinated and integrated approach that maximized the use of available time and the talents of the project team. The approach was designed to reflect an appreciation for the scrutiny to which the report's conclusions will be subjected by Congress and the

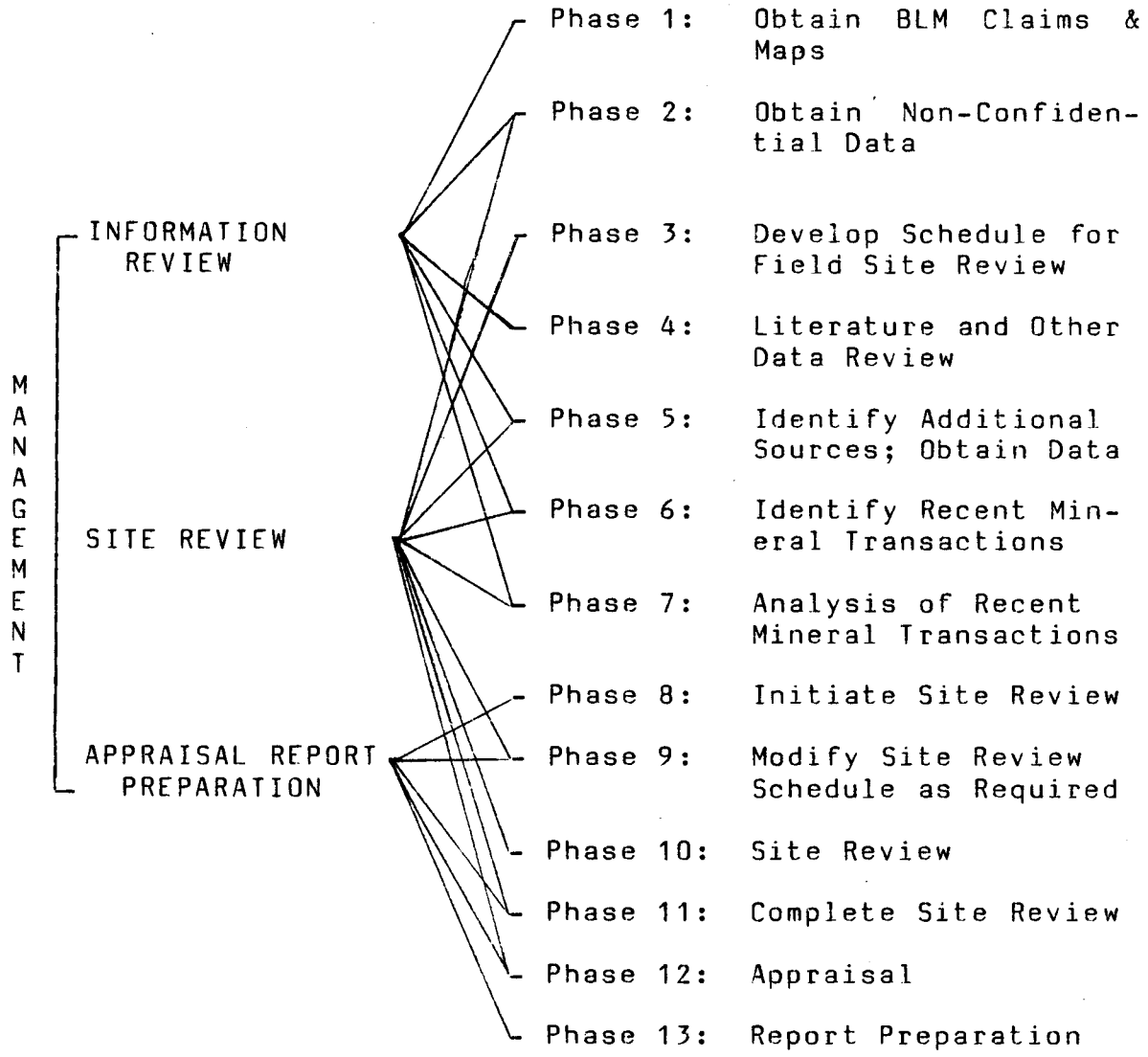
general public. Special consideration was given to techniques that normalized variations due to the subjective base of the valuations. Four key efforts: Information Review, Site Review, Appraisal/Report Preparation and Management were carried out in 13 Phases. Though the initial DOWL/PLANgraphics proposal included 14 Phases, Phase 7 (identify other claims and owners) was deleted by agreement and the Phases have been renumbered for this report. Figure 5 illustrates the relationship between the projects 13 phases and the principal tasks and the following discussion summarizes the tasks undertaken.

Phase 1: Obtain BLM Claims and Maps. Upon receipt of a Notice to Proceed the project team obtained from the Bureau of Land Management (BLM) a list and maps of mining claims and mining properties within the Kantishna Hills and Dunkle Mine study areas. These maps where reproduced for field use and were compared to information collected in Phases 2 and 4.

Phase 2: Obtain Non-Confidential Data. At project initiation, the project team contacted the Anchorage office of the Bureau and gained access to non-confidential data in the Bureau's library and files.

Phase 3: Develop Schedule for Field Site Review. Based on the preliminary information available, a field itinerary was developed and logistical support organized. The site review team included a mining engineer and a field geologist, each with extensive experience in mineral valuation in Alaska. The field schedule reflected the anticipated duration of the field season, provisions for documenting daily activity, procedures for facilitating transfer of information between

FIGURE 5 - DETAILED WORK PROGRAM OF KANTISHNA HILLS/DUNKLE MINE STUDIES



the site review team and the information review team, and the use of helicopter support as needed.

Phase 4: Literature and Other Data Review. Beginning with the notice-to-proceed, the information review team initiated an extensive effort to identify and assemble information to support the valuation of mineral lands in the study area. This included reports describing mineralization, mineral values, and collateral data (for example, aerial photography) that assisted the site review team.

Phase 5: Identify Additional Data Sources; Obtain Data. In contrast to the literature review, this phase focused on personal interactions: interviewing individuals with first hand information concerning the various claims, the geology and mineralization of the study area, land and claim transfers, and the valuation of the resources and reserves.

Phase 6: Identify Recent Mineral Transactions. This information was derived from the literature, site reviews, specific appraisals, and public records. Documentation of recent mineral transactions proved sparse and only a limited amount of information was gathered during interviews in conjunction with the field valuations.

Phase 7: Analysis of Recent Mineral Transactions. Knowledge of recent mineral transactions was to be obtained through Phases 2, 5 and 6. The information gathered in Phase 6 was provided to the project team's appraiser as well as the field valuators.

Phase 8: Initiate Site Review. A two person site review team was deployed. The team consisted of an experienced mining engineer and a professional field geologist. Working together, the members developed a preliminary assessment of the study areas using procedures adapted from standard sources (for example, United States Department of the Interior - Bureau of Land Management (USDI-BML) Field Handbook for Mineral Examiners, Placer Examination Principle and Practice (John H. Wells, BLM Technical Bulletin No. 4) to account for the abbreviated field effort and general lack of geotechnical and geochemical data. The field assessments examined the composition and physical properties of the lode or placer material, the physical characteristics and location of the deposits, the availability of requisite infrastructure (for example, power, water), transportation access, the uses of the material, and proximity to market or processing. Detailed photographic and written records were developed and maintained.

Phase 9: Modify Site Review Schedule as Required. The site review schedule developed during Phase 3 was varied due to weather, accessibility problems, and the availability of helicopter support. The modifications also included a second field trip which focused on the valuation of surface estates and reexamination of selected patented lode claims.

Phase 10: Site Review. As described previously, the site review involved two professionals and was accomplished for stream segments and associated claims. Detailed notes and photographic records were retained by the field personnel. Field valuations were carried out during the period August 17

to August 25, 1983 and the supplemental visit for surface estate valuation occurred during September 7-9, 1983.

Phase 11: Complete Site Review. Prior to leaving the study area, the site and information review teams conferred with field personnel of the U.S. Bureau of Mines on the preliminary results and observations of the geotechnical and geochemical investigations.

Phase 12: Appraisal. Two parallel approaches to developing the mineral valuations for the Kantishna Hills and Dunkle Mine study areas were developed. Each approach was based on obtaining the estimated fair market value as if the area had remained open to mineral entry under the BLM. DOWL/PLANgraphics utilized the following definition of market value: "The highest price estimated in terms of money, which each ownership will bring, if exposed for sale in the open market, allowing a reasonable time to find a purchaser who buys with full knowledge of all the uses to which it is adapted and for which it is capable of being used."

Detailed discussion of the parallel appraisal approaches is presented in the following section. Generally, the first approach derived information from Phases 4, 5 and 8 and correlated it with the information derived from the field investigations. Through this process specific values were assigned to stream segments and associated claims.

A second valuation process was based on the total value of the minerals in place for each study area as derived from various collateral sources. Values from these sources were generally allocated among claim groups.

The results of the two valuation techniques are incorporated into the recommended valuation and the project team's recommendations.

Phase 13: Report Preparation. The final report documents and summarizes all contract work and provides recommendations and conclusions.

METHODOLOGY

The cost of acquiring mining properties in the Kantishna Hills and Dunkle Mine study areas was estimated in three steps, the first two occurring simultaneously.

Initially, previous assessments of mining property values were obtained and adjusted for inflation, as appropriate, to reflect current market value and mining costs. Secondly, value estimates were derived from a field reconnaissance of the Kantishna Hills and Dunkle Mine study areas. Surface estate values were appraised for all patented claims. Field observations were calibrated with preliminary drill data obtained from Salisbury & Dietz, Inc., and the results of a Bureau of Mines regional placer sampling program. The third step encompassed merging values derived from previous assessments with the DOWL/PLANgraphics field assessments.

To facilitate the storage, retrieval, and manipulation of data collected for each claim group, a data base was accumulated. This relational data base, used to generate the tables in this report, maintained the following data elements: BLM Serial Number, claim name, NPS code, Division of Geology and Geophysical Surveys (DGGS) kardex number, legal location, claimant number, name and address, and various value and cost data from the DOWL/PLANgraphics field reconnaissance and published/unpublished reports.

LITERATURE AND DATA SURVEY

A large number of published and unpublished reports were found to contain references to either Kantishna Hills or

Dunkle Mine study area. During the course of the study several sources were frequently used, in particular:

Bundtzen, T.K., Mineral - Resource Modeling, Kantishna - Dunkle Mine - Study Areas, Alaska. Report of Investigation 83-12, Division of Geological and Geophysical Surveys, Alaska Department of Natural Resources, 1983, 51 pp.

Chadwick, R. Mineral Appraisal of Properties in the Proposed Mount McKinley Addition. National Park Service Confidential Unpublished Report. 1976, 300 pp.

National Park Service, Denver Technical Center. Environmental Overview and Analysis of Mining Effects. Denali National Park and Preserve, Alaska. September 1981, 184 pp. and maps.

Several reports provided important supplements to the review. In all cases, data from these reports were referenced by Chadwick or Bundtzen. These included:

Chipp, E.R., Resource Associates of Alaska. Rotary Drill-Chip Evaluation of the Snoopy Prospect for Placid Oil Company, circa May, 1983.

Hawley, C.C. Mineral Appraisal of Lands Adjacent to Mount McKinley National Park, Bureau of Mines OFR 24-78. 1978, 184 pp.

Resource Exploration Consultants, Inc. Geologic Description of the N.I.M. Claim Block, Broad Pass, Alaska. Dec. 1980. 29 pp.

Seraphim, R.H. Kantishna Area - Alaska, July, 1960. 27 pp.

Bundtzen's 1983 report provided a current summary of the hypothetical resource base for both the Kantishna Hills and Dunkle Mine study areas. This mineral resource modeling was based on available information including channel and bulk samples, mine maps, and drilling, geological, and geophysical data acquired during past investigations. The author cautioned that the results were preliminary and subject to modification pending results of mineral studies during the summer of 1983.

For 41 lode deposits, Bundtzen reported: strike length, average width; depth; ore concentrations for silver, gold, lead, zinc; half-square resource volume estimates; and known reserves. Inferred resource and reserve estimates for 20 placer deposits in Kantishna Hills study area were presented. In addition, the metallic resources in the Dunkle Mine study area were summarized.

The 1976 Chadwick report was prepared for the NPS as a gross mineral appraisal for the (then) proposed expansion of Mount McKinley National Park. Chadwick's report included estimates of (then) current market value of mineral interests and claims in the area. The report presented in summary form gross "open market values" for approximately 45 "properties" that is, claims or claim groups. Chadwick included, for each

property, the following: inferred reserve; estimated recovered pay; estimated direct costs; indicated annual income; cash flow; carrying charges, capital equipment; principal and interest; present value; risk factors; and a net market value.

The map supplements for Alternative 2 of the draft NPS Environmental Overview and Analysis (1981) were used extensively in locating and cross referencing the varied citations to mining claims in the literature as well as the DOWL/PLANgraphics field reconnaissance.

Resource estimates from Bundtzen (1983) and resource estimates, costs, and market value from Chadwick (1976) were associated by claim group and by claim, where possible, by DOWL/PLANgraphics.

Chadwick's appraisals were based on 1975 metal prices and applied to groups of claims in the Kantishna Hills study area. For the DOWL/PLANgraphics literature survey estimation, Chadwick's estimates were adjusted to account for the escalation of metal prices and mining costs since 1975. Table 1 presents the escalation factor derived for minerals and mineral values in the Chadwick report. Table 2 summarizes cost inflation factors for the same period based on Consumer Price Index, Survey of Current Business. Both Chadwick's original market value and an "inflated" market value were retained for comparison to this study's valuation.

Bundtzen's data presented reserves (tons) and half-square resource estimates (tons). A market value was calculated using the resource data for claims and/or group of claims.

TABLE 1.- ESCALATION OF MINERAL VALUES
January 1977 - June 1981

Metal	Unit	Jan '77 value ($)	Jun '83 value ($)	Escalation factor
Gold	$/troy oz	132.83	416.75	3.14
Silver	$/troy oz	4.394	11.63	2.65
Antimony	$/lb	1.50	0.95	0.63
Lead	$/lb	0.26	0.216	0.83
Zinc	$/lb	0.37	0.404	1.09
Tungsten	$/lb	55.65	37.96	0.68
Copper	$/lb	0.66	0.825	1.25

TABLE 2.- COST ESCALATION FACTORS

Date	Factor*
January, 1977	1.00
July	1.01
January, 1978	1.07
July	1.12
January, 1979	1.17
July	1.25
January, 1980	1.33
July	1.41
January, 1981	1.48
July	1.56
January, 1982	1.61
July	1.67
January, 1983	1.67

*Factors converted from Consumer Price Index, Survey of Current Business (1977=1.00).

FIELD RECONNAISSANCE

A field reconnaissance was undertaken for patented and unpatented lode claims and placer streams identified in Alternative 2 of the Environmental Overview and Analysis of Mining Effects (NPS, 1981) for the Kantishna Hills and Dunkle Mine study areas. The reconnaissance was undertaken during two field efforts between August 17 and September 9, 1983. The field team consisted of a mining engineer, an exploration geologist, and a land appraiser. Reconnaissance included both helicopter survey and field visits. Complete photographic documentation was obtained. The following discussion describes the value estimation procedure for placer, lode, and surface estates on patented claims.

Placer Claims

As placers may be legally mined on lodes as well as placer claims, all claimed ground was studied for placer deposit potential. This objective was constrained by contractual limitations on field effort and the exclusion of sampling.

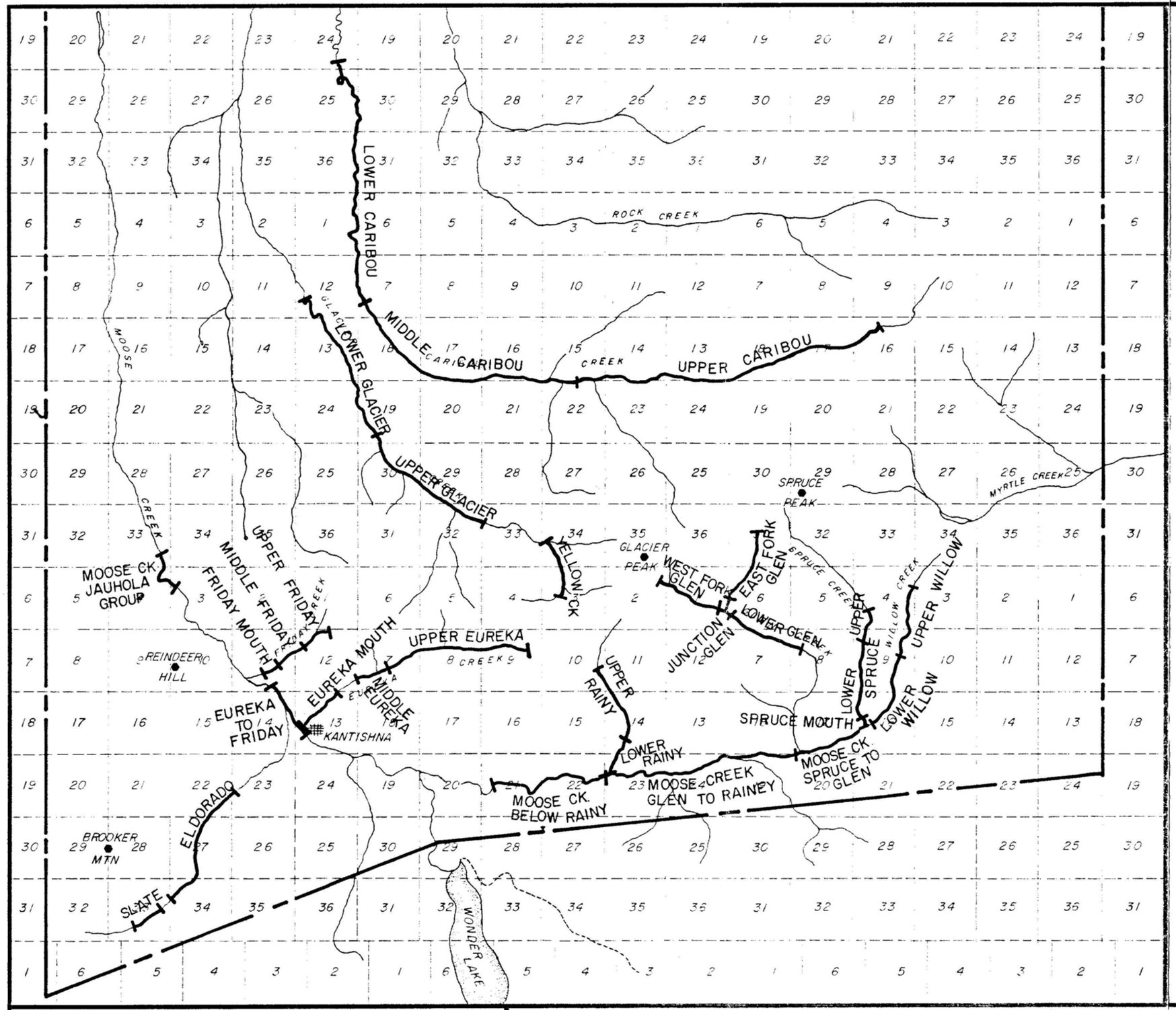
The greatest problem encountered was in the precise location of individual claims. Claim location errors of up to three miles were found in the maps provided with the DEIS. With the limited time and resources available, it was impossible to survey the claims or even search out claim corners, although corners were recorded wherever encountered.

Because the exact locations of the individual claims could not be determined, it was impossible to determine specific assessment factors for individual claims, such as the ratio

of stream versus bench placer deposits when these have different values. Although the exact location of most of the individual claims could not be verified, the relative position of the claims along the various stream segments could be assumed. Therefore, stream segments were used as the basic unit of appraisal.

For organizational purposes the placer claims were divided by streams and stream segments. The divisions were Friday, Eureka, Moose, Eldorado, Caribou, Glenn, Rainy, Slate, Spruce, Willow, Glacier, and Yellow Creeks in the Kantishna Hills study area and the Colorado Creek in the Dunkle Mine study area. These streams were further subdivided by stream segment to reflect various physical features lending themselves to the field assessment (for example, width, presence of benches, stream bends, gravel depths, and others). Demarcations of each stream segment examined during the field reconnaissance are presented in figure 6 and 7 for Kantishna Hills and the Dunkle Mine study areas respectively. Table 3 presents a cross reference between stream segments and those placer claims for which valuations were made in this study.

Each segment was visited following at least one aerial overview. The field team sought out miners and others present in the vicinity to discuss particular features of the claim(s). Particular attention was directed, in both observations and discussions, to such factors as accessibility to water and roads, equipment, terrain, the quality of ground, vegetation and course overburden, geologic structures, cost of operation, extent of previous mining, and development work, to name a few.



EXPLANATION

Stream Segments

PLACER SEGMENTS

- LOWER CARIBOU
- MIDDLE CARIBOU
- UPPER CARIBOU
- LOWER GLACIER
- UPPER GLACIER
- YELLOW CREEK
- WEST FORK GLEN
- JUNCTION GLEN
- EAST FORK GLEN
- LOWER GLEN
- MOOSE CREEK, JAUHOLA GROUP
- UPPER FRIDAY
- MIDDLE FRIDAY
- FRIDAY MOUTH
- SLATE
- ELDORADO
- EUREKA TO FRIDAY
- EUREKA MOUTH
- MIDDLE EUREKA
- UPPER EUREKA
- MOOSE CREEK BELOW RAINEY
- UPPER RAINEY
- LOWER RAINEY
- MOOSE CREEK, GLEN TO RAINEY
- MOOSE CREEK, SPRUCE TO GLEN
- UPPER SPRUCE
- LOWER SPRUCE
- SPRUCE MOUTH
- LOWER WILLOW
- UPPER WILLOW

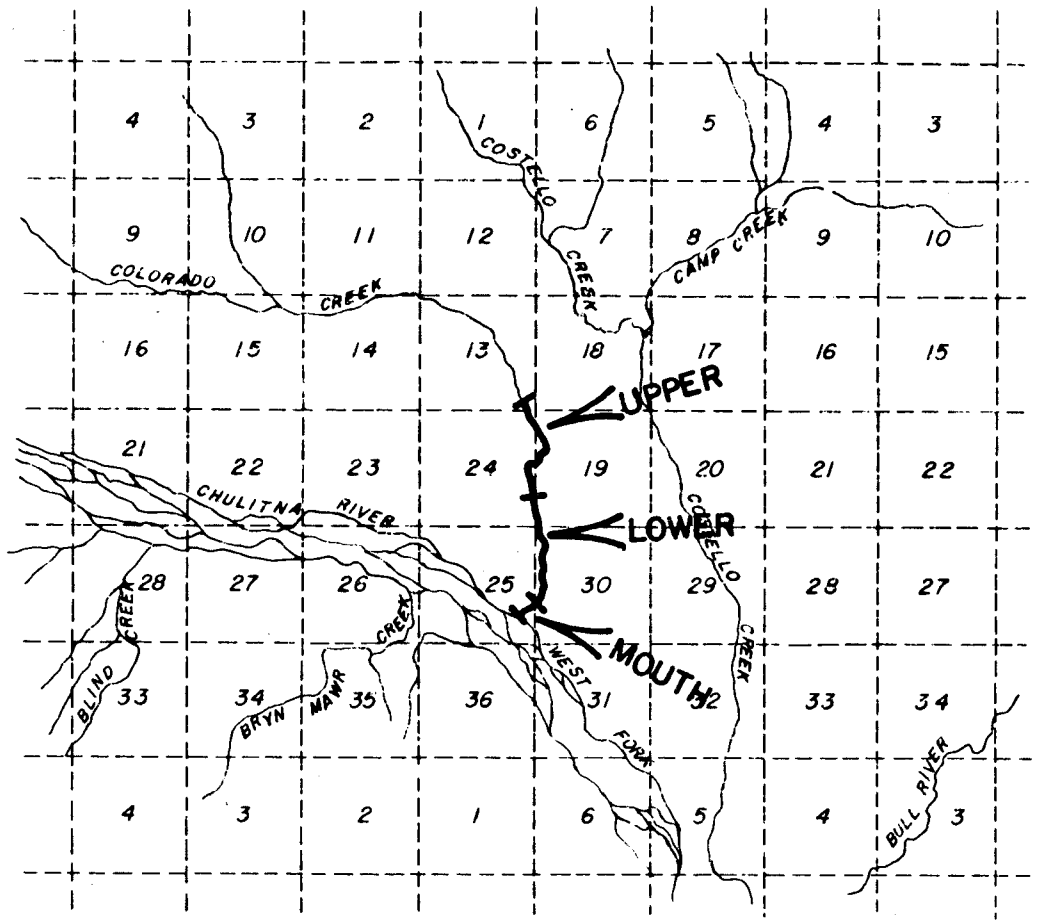
ENVIRONMENTAL OVERVIEW STUDY AREA BOUNDARY, 1981

0 1 2 3 KILOMETERS
0 1 2 MILES

SCALE : 0.6 " = 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC.

Figure 6 KANTISHNA HILLS STUDY AREA PLACER STREAM SEGMENTS



EXPLANATION

Stream Segment

0 1 2 3 KILOMETERS

0 1 2 MILES

SCALE: 0.6" = 1 MILE

DOWL ENGINEERS / PLANGRAPHICS, INC.

Figure 7 DUNKLE MINE STUDY AREA PLACER STREAM SEGMENTS

TABLE 3.- CROSS REFERENCE
STREAM SEGMENTS AND PLACER CLAIMS

DOWL/PLANgraphics Stream Segments	National Park Service Claim Reference	Serial No. BLM
KANTISHNA HILLS STUDY AREA		
Upper Eureka	EC3-EC7, UD8-UD10	FF052400-407
Middle Eureka	EC1, EC2	FF052398-99
Eureka Mouth	D1-D3	FF048856-58
Upper Friday	A3, A4	FF059052,53
Middle Friday	A1, A2	FF059050,51
Friday Mouth	DI	FF046218
Slate	AT1, AT2	FF062095,96
Eldorado	L13-L20	FF059200-207
Upper Spruce	S7, S8	FF059272,73
Lower Spruce	S2-S6	FF059267-271
Spruce Mouth	S1	FF059266
Upper Rainy	R4-R8	FF059277-81
Lower Rainy	R1-R3	FF059274-76
E. Fork Glen	GK12-GK15, Part GK11	FF061242-46
W. Fork Glen	GK8-GK10, Part GK7	FF061238-41
Jctn. of Forks	Parts of GK7, GK11, GK6	FF061237-38, FF061242
Lower Glen	GK1-GK5, Part GK6	FF061232-37
Upper Willow	W4-W8	FF059261-65
Lower Willow	W1-W3, L53, L54	FF059258-60; FF059240,41
MOOSE CREEK		
Spruce to Glen	L48-L52	FF059235-39
Glen to Rainy	L35-L47	FF059222-34
Below Rainy	L22-L28	FF059209-15
Eureka to Friday	T3, T4, B, MC1, MC2	FF059247,48,49; FF049256,57
Jauhola Group	J1-J3	FF052018-20
Yellow	YP1-YP4	FF059029-31
Upper Glacier	LD1-LD4	FF059038-41
	RH1-RH3	FF052015-17
	SK1-SK3	FF045437-39
Lower Glacier	GA1-GA5, GAB3	FF055397-401;FF055402
Upper Caribou	HCA15-HCA24	FF052388-97
Middle Caribou	HCA7-HCA14	FF052380-87
Lower Caribou	HCA1-HCA6, HA2A	FF052374-79,FF052373
	HBA1-HBA6, HA3A	FF052366-71,FF052372
DUNKLE MINE STUDY AREA		
Upper Colorado	6-9	AA023368-71
Lower Colorado	2-5	AA023364-67
Colorado Mouth	1	AA023363

Detailed photographic records were made of each stream segment. In addition, extensive field notes documented both observations and interviews. A Valuation Survey Form was completed for each site following the field reconnaissance, an examination of the photography, and a review of available literature. A copy of a completed survey form is included as appendix A for illustrative purposes.

A second form, Placer Matrix, was also developed as an intermediary in calculating the value of estimated reserves and the anticipated cost of extraction. A sample of the form is included as appendix B.

Lode Claims

Lode claims are naturally divided by several geographic features: Quigley Ridge, Alpha Ridge, and the Red Top complex including the Banjo and Spruce-Glen mineralized area. Each of the claims were included in aerial as well as ground reconnaissance activities. Information was gathered through interviews though there was little activity associated with development of these claims. Information obtained from an active prospect, the Silver King 18, was obtained.

Preliminary geotechnical and geochemical data were obtained from the summer drilling program conducted by Salisbury & Dietz, Inc. for the U.S. Bureau of Mines and from a regional placer sampling program undertaken by Bureau of Mines personnel.

Salisbury & Dietz, Inc. of Spokane, Washington were contracted by the Bureau of Mines to perform mineral investigations during the 1983 field season in the Kantishna Hills and the Dunkle Mine study areas. The investigation included limited core drilling of lode deposits in Kantishna study area and cable tool sampling in placer deposits in Kantishna. Analysis of the samples followed the field season. Preliminary results of this analysis were shared with DOWL/PLANgraphics and used to corroborate the results of the independent field reconnaissance.

The regional placer sampling program of the Bureau of Mines concentrated efforts along drainages where data were not obtained by the Salisbury & Dietz, investigations and which lacked recent or past placer mining activity. The effort included significant field observations and yielded 157 sample; 148 from Kantishna Hills study area and 9 from the Dunkle Mine study area. Bureau of Mines personnel shared their field observations and the preliminary results of the geochemical analysis with DOWL/PLANgraphics.

The observations and data from the summer field investigations were incorporated with, and compared to, previously published data and unpublished information provided by the U.S. Bureau of Mines. Mineral valuation survey forms were used to summarize all pertinent data. A lode claim matrix was prepared, subsequently, representing the specific data and sources used to derive the mineral valuation.

SURFACE ESTATE VALUES - PATENTED LAND

According to the National Park Service, 34 patented lode claims are located in the Kantishna Hills study area and no patented claims are located in the Dunkle Mine study area. The patents place no significant restrictions on surface use. The surface estate, therefore, can possess significant value beyond that attributed to the mineral estate.

The objective of this component of the valuation effort was to determine the market value of the surface rights of patented mining claims in the Kantishna Hills study area.

Because of many unique features of the properties a simple valuation, developed through the use of traditional appraisal techniques, was not possible. This was due not only to the positive amenities and features of the properties but also their negative features, and a lack of a defined market and a comparative basis created by similar properties which were bought or sold on the open market.

The obvious positive features of the properties, in terms of the market value of the surface rights, include:

- location inside a major national park
- direct road access
- view amenity of Mt. McKinley and Wonder Lake
- privilege of road access through the park

- airstrip
- an exclusive private holding of property that is unlikely to be enlarged.

The properties also have a number of negative features which include:

- location distant from a population center
- regulatory jurisdiction of the National Park Service.
- uncertainty of use and market
- limitation of commercial use of the Denali Park and Preserve for tourism due to present Park Service policies
- winter limitation of access and use due to weather conditions
- questions regarding the legal status of access roads and overlapping ownership.

The valuation of the properties did not only address the above features but also identified the potential users of the property, the marketplace, the market value, and its highest and best use.* For the purpose of the valuation, the

*Real Estate Appraisal Terminology, published jointly by the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers, Ballinger Pub. Company, c. 1975.

"marketplace for the properties" meant "the market that would pay the highest price".

"Market Value" was defined as: "The most probable price in terms of money which a property will bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller, each acting prudently, knowledgeably, and assuming the price is not affected by undue stimulus."

Implicit in this definition was the consummation of a sale as of a specified date and the passing of title from seller under conditions whereby:

1. both buyer and seller were typically motivated.

2. both parties were well informed or well advised, and are each acting in their best self-interest.

3. a reasonable time was allowed for exposure to the open market.

4. payment was made in cash or its equivalent.

5. financing, if any, was on terms generally available in the community at the specified date and typical for the property type in its locale.

6. the price paid represented a normal consideration for the property sold unaffected by special financing amounts and/or terms, services, fees, costs, or credits incurred in the transaction.

Highest and Best Use* is defined as: "The reasonable and probable use that supported the highest present value, as defined, as of the effective date of the appraisal. Alternatively, that use, from among reasonably probable and legal alternative uses, found to be physically possible, appropriately supported, financially feasible, and which resulted in the highest land value."

Current convention has adopted the concept of "most probable use" which more realistically acknowledges that for any given property, there are probably more than one use which will yield a suitably high rate of return.

Valuation Techniques

There were three basic techniques that could be used in order to value the properties: by comparison with like property sales, by use of a residual analysis, and by market survey methods. In addition to the technical requirements of these approaches, the application of each of these is constrained, to a greater or lesser degree, by the time and budgetary constraints of the project.

There were no other properties in the State of Alaska which duplicate the sum of the influences affecting these patented claims. Thus, in order to effect a comparison with dissimilar properties, adjustments were required for various influences without sound basis in the market and resulted in a speculative conclusion.*

*Although time and budget do not permit, a valid way of estimating the value of the properties would be to carefully analyze the values indicated by the sales of inholdings inside major national parks in the contiguous 48 states.

The residual analysis method was potentially a valid indicator of the value that a commercial operator would assign to the surface estate of these claims. This would necessitate a very complex and lengthy analysis starting with the income that a hypothetical commercial lodge operator could achieve and working backward to the residual income that could be attributed to the parcel of land. This technique has the added limitation of usually being an analysis that only major real estate investors and/or businesses use. It is not commonly used by small businesses. Typically, a small operator will over estimate the amount available for the purchase of land.

The market survey had a number of strengths working for it in areas that the other two techniques did not. It allowed the major value influences to be considered by a respondent who responded with a price or value judgment. It is expected that this estimate would be very close to the market value but would be limited by the fact that no true transaction, where money changed hands, took place. Nor does the procedure duplicate the influence of negotiation in which the buyer and seller will compromise, theoretically, to a price below asking and above the first offer.

An additional advantage of the market survey is that it allowed the respondents to be categorized for different reasons, such as location, knowledge, probable use, and so on with appropriate consideration given each class of respondent.

For this project, the market survey technique was chosen as the primary basis of the valuation, supplemented by field reconnaissance.

DOWL/PLANGRAPHICS ACQUISITION ESTIMATES

The first two steps in the value estimation process, the review of values and costs imbedded in the literature and the results of field assessments, resulted in value estimates which are in turn evaluated in a third step.

It was originally anticipated that the evaluation procedure would involve weighting and combining the values determined from Bundtzen, Chadwick and DOWL/PLANgraphics valuations. The resultant average would have produced the estimated market value.

This approach was abandoned. It became apparent during the analysis phase that the 3 sets of values were less than independent; each incorporated and supplemented the prior work. The historical data are presented in the summary section on literature and data survey. The historical data were inflated or extended to present values for comparative purposes.

SUMMARY OF LITERATURE AND DATA SURVEY

Information for placer and lode claims for the Kantishna Hills and Dunkle Mine study areas was extracted from Chadwick (1977) and Bundtzen (1983).

These provided statistical information on estimated reserves and resources and supplemented and supported the DOWL/PLANgraphics field reconnaissance effort. There data also provided approximations of current value when adjusted for inflation and, in the case of Bundtzen, extended to hypothecate mining costs and mineral values. Four values were key to these approximations:

1. Resource Value in situ - the value of the mineral deposit (based on reserves or resources, as noted) and using July '83 mineral values.

2. Operating Costs - estimated from literature andinterviews.

3. Net Resource Value - resource recovery value less operating cost of extraction.

4. Estimated Market Value - the present worth of the Net Resource Value.

The approximations were developed to supplement and provide a coarse comparative base for the values generated from the DOWL/PLANgraphics field work.

Generally, the aggregation of claims into claim groups by Bundtzen closely reflected claim groups recognized by Chadwick. These were comparable to aggregations of stream segments discussed previously. There were substantial variations in estimated reserves with Bundtzen's examination consistently indicating higher quantities of available ore. This variance created substantial differences when values were updated or, in the case of Bundtzen's figures, calculated.

Chadwick's original data (1977) were adjusted for inflation using the indices described in the methodology section. Both estimated recovered pay and estimated direct costs for 1977 were adjusted to 1983 dollars. A 1983 adjusted value for each claim group was calculated. No effort was made to incorporate other cost considerations included in Chadwick's original estimate such as to maintain comparability with values calculated from the DOWL/PLANgraphics field reconnaissance. Appendix C documents the calculations for both placer and lode claims, as grouped by Chadwick. Table 4 summarizes the resultant "updated" market values.

The results of Bundtzen's half-square resource analysis were converted into estimated resource values by applying a series of factors incorporating current (June 1983) mineral values and extraction costs. Appendix D documents the calculations converting Bundtzen's reserve estimates to valuations of claim groups. A summary of the valuations derived from Bundtzen's reserve estimates is provided in table 5.

These approximations introduced certain anomalies into the estimated net resource values. As an instance, Bundtzen

TABLE 4.- SUMMARY OF INFORMATION DERIVED FROM CHADWICK (1976)

DOWL/PLANgraphics Stream Segments	National Park Service Claim Reference	Inferred Reserves (cy)	Net Resource Value-1977 ($)	Net[2] Resource Value-1983 ($)
KANTISHNA HILLS STUDY AREA: PLACER				
Upper Eureka Middle Eureka Eureka Mouth	EC3-EC7, UD8-UD10 EC1, EC2 D1-D3	80,000 Worked Out	480,000 Nominal	1,741,000 -0-
Eureka TOTAL		80,000	480,000	1,740,800
Upper Friday Middle Friday Friday Mouth	A3, A4 A1, A2 DI	Worked Out Worked Out	Nominal Nominal	-0- -0-
Friday TOTAL				-0-
Slate TOTAL Eldorado TOTAL	AT1, AT2 L13-L20	Non-Commercial Untested	Nominal Nominal	-0- -0-
Upper Spruce Lower Spruce Spruce Mouth	S7, S8 S2-S6 S1			
Spruce TOTAL		800,000	2,400,000	8,702,000
Upper Rainy Lower Rainy	R4-R8 R1-R3			
Rainy TOTAL		Untested	20,000	63,000
E. Fork Glen W. Fork Glen Jctn. of Forks Lower Glen	GK12-GK15, Part GK11 GK8-GK10, Part GK7 Parts of GK7, GK11, GK6 GK1-GK5, Part GK6			
Glen TOTAL		60,000	240,000	841,000
Upper Willow Lower Willow	W4-W8 W1-W3, L53, L54			
Willow TOTAL		Minimum	None	-0-

See footnotes at end of table 4.

TABLE 4.- SUMMARY OF INFORMATION DERIVED FROM CHADWICK (1976). - (Continued)

DOWL/PLANgraphics Stream Segments	National Park Service Claim Reference	Inferred Reserves (cy)	Net Resource Value-1977 ($)	Net[2] Resource Value-1983 ($)
MOOSE CREEK				
Spruce to Glen	L48-L52			
Glen to Rainy	L35-L47			
Below Rainy	L22-L28			
Upper Moose TOTAL		2,750,000	2,200,000	11,632,000
Eureka to Friday	T3, T4, B, MC1, MC2	1,100,000	4,400,000	15,417,000
Jauhola Group	J1-J3	Untested	Nominal	-0-
Lower Moose TOTAL		1,100,000	4,400,000	15,417,000
Yellow	YP1-YP4	Worked Out	None	-0-
Upper Glacier	LD1-1D4			
	RH1-RH3			
	SK1-SK3			
Lower Glacier	GA1-GA5, GAB3			
Glacier TOTAL		500,000	625,000	2,511,000
Upper Caribou	HCA15-HCA24	130,000	390,000	1,605,000
Middle Caribou	HCA7-HCA14	185,000	462,500	1,588,000
Lower Caribou	HCA1-HCA6, HA2A	500,000	750,000	2,720,000
	HBA1-HBA6, HA1A			
Caribou TOTAL		815,000	1,602,500	5,913,000
TOTAL KANTISHNA HILLS STUDY AREA: PLACER				46,819,000
DUNKLE MINE STUDY AREA: PLACER				
Upper Colorado	6-9	n.d.		
Lower Colorado	2-5	n.d.		
Colorado Mouth	1	n.d.		
Colorado TOTAL				n.d.
TOTAL DUNKLE MINE STUDY AREA: PLACER				n.d.

See footnotes at end of table 4.

TABLE 4.- SUMMARY OF INFORMATION DERIVED FROM CHADWICK (1976). - (Continued)

Claim Number	Claim Name	Chadwick		
		Estimated Reserves (T)	Net Resource Value-1977 ($)	Net[2] Resource Value ($)
KANTISHNA HILLS STUDY AREA: PATENTED LODE				
1.	Whistler	(3)		
2.	Bright Light	(3)		
3.	Lucky Strike	25,000	1,050,000	6,125,000
4.	Galena	2,100	157,500	263,000
5.	Red Top	(3)		
6.	Star	(3)		
7.	Friday	(3)		
8.	Martha Q.	(3)		
9.	Pollywonder	(3)		
10.	Gold Dollar	2,160	60,480	689,000
11.	Golden Eagle	(3)		
12.	Francis	(3)		
13.	Little Maud	(3)		
14.	Little Annie	(3)		
15.	Little Annie #2	(3)		
16.	Silver Pick #2	(3)		
17.	Silver Pick	2,840	96,900	162,000
18.	Darling	(3)		
19.	White Hawk	(3)		
20.	Water Level	(3)		
21.	Sulfide	(3)		
22.	Keystone	(3)		
23.	Pennsylvania	(3)		
24.	Gold King	5,000	210,000	1,225,000
25.	East Gold King	(4)		
26.	Blue Bell	(4)		
27.	Pittsburgh	(3)		
28.	Doherty	(3)		
29.	Merry Widow	10,000	420,000	2,450,000
30.	Silver King	2,000	74,000	1,640,000
31.	Jupiter-Mars	(5)		
32.	Chloride	(5)		
33.	Waterloo	(5)		
34.	Chlorine	(5)		
TOTAL KANTISHNA HILLS STUDY AREA: PATENTED LODE				12,554,000

See footnotes at end of table 4.

TABLE 4.- SUMMARY OF INFORMATION DERIVED FROM CHADWICK (1976). - (Continued)

Claim Number	Claim Name	Chadwick		
		Estimated Reserves (T)	Net Resource Value-1977 ($)	Net[2] Resource Value ($)
KANTISHNA: UNPATENTED LODE				
A	RED 1	n.d.	n.d.	
B	BANJO	n.d.	n.d.	
C	HARDROCK	n.d.	n.d.	
D	PASS	n.d.	n.d.	
E	TUGBOAT ANNIE	n.d.	n.d.	

1. Calculations shown in appendix B.
2. Based on inflation factors presented in tables 1 and 2.
3. Total tonnage combined with Lucky Strike (Quigley Group)
4. Total tonnage combined with Gold King.
5. Total tonnage combined with Merry Widow (Taylor Group)

Notes -

n.d. = No data
Totals affected by rounding

TABLE 5.- SUMMARY OF INFORMATION DERIVED FROM BUNDTZEN (1983)

DOWL/PLANgraphics Stream Segment	National Park Service Claim Reference	Bundtzen			
		Inferred Reserves (cy)	Estimated Gold (oz/cy[1])	Estimated Gold (oz.)	Net[2] Resource Value 1983 ($)
KANTISHNA HILLS STUDY AREA: PLACER					
Upper Eureka	EC3-EC7, UD8-UD10	170,000	.010	1700	283,000
Middle Eureka Eureka Mouth	EC1, EC2 D1-D3	300,000	.024	7200	2,251,000
Eureka TOTAL					2,534,000
Upper Friday	A3, A4				
Middle Friday	A1, A2				
Friday Mouth	DI				
Friday TOTAL		670,000	.030	20100	6,702,000
Slate TOTAL	AT1, AT2	n.d.			
Eldorado TOTAL	L13-L20	270,000	.020	5400	1,576,000
Upper Spruce	S7, S8				
Lower Spruce	S2-S6				
Spruce Mouth	S1				
Spruce TOTAL		975,000	.011	10725	2,032,000
Upper Rainy	R4-R8				
Lower Rainy	R1-R3				
Rainy TOTAL		190,000	.010	1900	317,000
E. Fork Glen	GK12-GK15, Part GK11				
W. Fork Glen	GK8-GK10, Part GK7				
Jctn. of Forks	Parts of GK7, GK11, GK6				
Lower Glen	GK1-GK5, Part GK6				
Glen TOTAL		500,000	.018	9000	2,501,000
Upper Willow	W4-W8				
Lower Willow	W1-W3, L53, L54				
Willow TOTAL		50,000	.001	50	2,000[3]

See footnotes at end of table 5.

TABLE 5.- SUMMARY OF INFORMATION DERIVED FROM BUNDTZEN (1983). - (Continued)

DOWL/PLANgraphics Stream Segment	National Park Service Claim Reference	Bundtzen			
		Inferred Reserves (cy)	Estimated Gold (oz/cy[1])	Estimated Gold (oz.)	Net[2] Resource Value 1983 ($)
MOOSE CREEK					
Spruce to Glen	L48-L52				
Glen to Rainy	L35-L47				
Below Rainy	L22-L28				
Upper Moose TOTAL		5,300,000	.0038	20140	839,000[3]
Eureka to Friday	T3, T4, B, MC1, MC2				
Jauhola Group	J1-J3				
Lower Moose TOTAL		3,730,000	.0176	65650	18,035,000
Yellow	YP1-YP4	20,000	.009	180	25,000
Upper Glacier	LD1-1D4				
	RH1-RH3	50,000	.025	1250	396,000
	SK1-SK3				
Lower Glacier	GA1-GA5, GAB3	500,000	.025	12500	3,959,000
Glacier TOTAL		570,000		12930	4,380,000
Upper Caribou	HCA15-HCA24	180,000	.019	3420	975,000
Middle Caribou	HCA7-HCA14	500,000	.015	7500	1,876,000
Lower Caribou	HCA1-HCA6, HA2A	4,000,000	.022	88000	26,674,000
	HBA1-HBA6,HA1A				
Caribou TOTAL		4,680,000		98920	29,525,000
TOTAL KANTISHNA HILLS STUDY AREA: PLACER					$68,443,000
DUNKLE MINE STUDY AREA: PLACER					
Upper Colorado	6-9	n.d.			
Lower Colorado	2-5	n.d.			
Colorado Mouth	1	n.d.			
Colorado TOTAL		n.d.			-0-
TOTAL DUNKLE MINE STUDY AREA: PLACER					-0-

See footnotes at end of table 5.

TABLE 5.- SUMMARY OF INFORMATION DERIVED FROM BUNDTZEN (1983). - (Continued)

Claim Number	Claim Name	Bundtzen			
		Estimated Reserves (T)	Net Pay ($/T)	Est. Cost ($/T)	Net Resource Value ($)
KANTISHNA HILLS STUDY AREA: PATENTED LODE					
1.	Whistler	652	255	130	68,000
2.	Bright Light	n.d.			
3.	Lucky Strike	3,875	112	130	-43,000[4]
4.	Galena	2,647	743	150	1,570,000
5.	Red Top	20,407	1753	150	32,712,000
6.	Star	3,281	913	150	2,503,000
7.	Friday	c.			c.
8.	Martha Q.	n.d.			--
9.	Pollywonder	n.d.			--
10.	Gold Dollar	22,500	639	150	11,003,000
11.	Golden Eagle	5,294	616	150	2,467,000
12.	Francis	468	184	150	16,000
13.	Little Maud	n.d.			--
14.	Little Annie	90,000	241	150	8,190,000
15.	Little Annie #2	n.d.			--
16.	Silver Pick #2	n.d.			--
17.	Silver Pick	169,411	503	150	59,802,000
18.	Darling	n.d.			--
19.	White Hawk	28,823	125	130	360,000[4]
20.	Water Level	3,750	115	130	43,000[4]
21.	Sulfide	n.d.			--
22.	Keystone	26,660	250	150	2,666,000
23.	Pennsylvania	18,750	192	150	788,000
24.	Gold King	n.d.			--
25.	East Gold King	n.d.			--
26.	Blue Bell	n.d.			--
27.	Pittsburgh	n.d.			--
28.	Doherty	n.d.			--
29.	Merry Widow	3,229	202	130	233,000
30.	Silver King	5,625	483	150	1,873,000
31.	Jupiter-Mars	76,050	209	150	4,487,000
32.	Chloride	n.d.			--
33.	Waterloo	750	239	130	82,000
34.	Chlorine	n.d.			--
TOTAL KANTISHNA HILLS STUDY AREA: PATENTED LODE					128,906,000

See footnotes at end of table 5.

TABLE 5.- SUMMARY OF INFORMATION DERIVED FROM BUNDTZEN (1983). - (Continued)

Claim Number	Claim Name	Bundtzen			
		Estimated Reserves (T)	Net Pay ($/T)	Est. Cost ($/T)	Net Resource Value ($)
KANTISHNA HILLS STUDY AREA: UNPATENTED LODE					
A	RED 1	n.d.			
B	BANJO	45,000	214	150	14,000
C	HARDROCK	n.d.			
D	PASS	n.d.			
E	TUGBOAT ANNIE	n.d.			
TOTAL KANTISHNA HILLS STUDY AREA: UNPATENTED LODE					$14,000

1. Average pay (oz/cy) from DOWL/PLANgraphics field reconnaissance.
2. Assumes $2.50 cy operating cost; $416.75 (July 1, 1983) gold value.
3. A value of 10% of estimated pay is assigned to reflect potential value on portions of streams with calculated negative net resource values.
4. A value of 10% of estimated pay is assigned to reflect potential value on lode claims with calculated negative net resource values.

Note -

n.d. = no data.
c. = combined with previous claim.
Totals affected by rounding

presented resource estimates for upper Moose Creek. Average pay (oz/cy) data and operating costs for this stream segment indicated that mining is currently not economic and as a result has no net resource value. Yet portions of this segment may well be mined profitably and have a current net resource value. In those instances, the value of the claim was assumed to be a percentage of the in-situ resource value.

Table 6 summarizes the total valuations calculated from Chadwick's and Bundtzen's data for the Kantishna Hills and Dunkle Mine study areas.

TABLE 6. - NET RESOURCE VALUE (1983) SUMMARY

Study Area	Conversion From Chadwick ($)	Estimates Based on Bundtzen ($)
Kantishna Hills		
Placer	46,819,000	68,443,000
Lode	12,554,000	128,906,000
Dunkle Mine		
Placer	n.d.	n.d.
Total Study Area	$59,373,000	197,349,000

From tables 4 and 5.

PLACER AND LODE IN SITU RESOURCE ESTIMATES

This section contains two subdivisions: The first section discusses field observations and assumptions leading to an estimated value for each placer stream segment; and, the second section provides parallel information for lode claims. Summary information is presented for both subdivisions and supplemental information and supporting calculations are referenced to appendixes.

PLACER CLAIMS

Field investigations and interviews were directed at obtaining the following:

- the width of the minable ground
- the thickness of the minable ground, including bedrock
- distribution of the gold within the minable ground
- amount of gold per bank cubic yard (BCY)
- extent of previous mining activity, depth of working, and recovery factor
- size grades of the gold
- fineness of gold
- recovery factors of current operations

- operating costs

- miscellaneous factors such as nature of the ground, presence of boulders or clay, adequacy of water supply and access.

Most of the operators/owners present during the field investigation were cooperative and consented to interviews. With few exceptions, it was felt that the miners were candid and provided accurate data. Field personnel provided valuable sample and other data, which, in almost all cases, verified data obtained from the miners. This information was later augmented by preliminary analysis of the Bureau regional placer sampling program and the investigation undertaken by Salisbury & Dietz, Inc.

The inaccurate location of individual claims on maps incorporated into the Draft Environmental Impact Statement and provided by the National Park Service was a problem frequently encountered. The exact locations of many individual claims could not be determined, especially in those cases where side by side claims were partially worked or where there was less than 1320 ft of mining width.

Along most streams in these areas, both stream channel gravels and adjacent benches or slopes contain gold. Because the dimensions, unit values, and extent of previous mining activity differ for these different placer deposits they were described separately in the field notes and combined in subsequent analysis.

Several of the factors used in estimating placer reserves and values require definition or an explanation of the assumptions upon which they are based. Several of the factors appearing in the placer matrix presented in appendix B are described as:

Length of placer under claim (1)*: Without a proper survey, it was assumed that all individual placer claims were of maximum legal dimensions (generally 660 feet x 1320 ft) and centered on the streams. It was also assumed that claims along a stream segment had common end lines with neither overlap nor gaps of unclaimed ground. The triangles of overlap and gap formed at bends in the streams were generally ignored. Although a potentially important factor for individual claims, the overlap/gap pairs tend to cancel out one another except at the extremes of the segments. At these locations, area and volumetric adjustments were made. Data were collected for length of both stream channel and bench placers, as appropriate.

Workable width of placer under claim (2): Data for both stream channel and bench or slope placers were derived from field observations, measurements from air and ground photos, from interviews with the miners, and personnel from the Bureau of Mines and Salisbury & Dietz, Inc.

On most streams, the width of stream channel gravel varies from about 50 ft in the upper segments to 200 ft

*references appendix B, Placer Matrix form.

in the lower segments. The generally ubiquitous bench deposits extend the minable ground to well beyond full claim width in the lower portions of the streams. However, the nature and width of the benches along the upper reaches of the streams varies greatly.

Workable thickness of placer under claim (3): The best source of these data were the operators themselves, though Bureau and Salisbury & Dietz personnel had made a few test pits which corroborated the operators' estimates in all cases.

All operators interviewed felt that the best values were found in bedrock cracks and typically processed from 2 to 6 ft of bedrock depending on equipment constraints, nature of bedrock, and individual experiences.

Volume of placer deposit BCY (4): The product of length, width, and thickness. Reference table 7, columns 1 through 4.

Unit resource value (5): These data were recorded in the form presented by the operator, Bureau of Mines personnel, or as given in the literature. Data were reported in a plethora of units, including: dollars per yard...per ton...per square foot of bedrock...per hour ...per season...per day...per shift...per clean-up; ounces per ton...per square foot...per test hole...per week...per clean-up...per cubic yard run...per test pit square yard...per week...per acre;...pennyweight per cubic yard...milligrams per cubic yard; and colors per pan.

To achieve consistency, data were converted to ounces per bank cubic yard (oz/BCY) and presented in column 5 of table 7. This involved assumptions of swell factor for materials moved (1.25), the price of gold, and operating rates. Reported values thus calculated range from 0.001 to 333 oz/cy, with most values between 0.018 and 0.026 oz/cy.

Although the Bureau of Mines and Salisbury & Deitz, Inc., sampling data were the most precise, these data were based on very small samples and were considered less reliable than actual season-long production data adjusted for recovery.

Fineness (7): In the Kantishna Mining District fineness ranges from .670 Au on Lower Caribou Creek to .900 Au on upper Eureka and upper Moose Creeks. Because there is no valid average fineness for Kantishna Hills and Dunkle Mine study areas' gold, individual fineness factors were assumed for each stream segment based on interveiws with claimant. The difference between the fineness of gold and absolute purity (1000 fine) is the presence of silver with up to 2 parts per thousand copper. Technically native "gold" carrying more than 16% silver is the mineral "electrum," a difference which does not affect appraisal.

Market classes by % (8): Much of the Kantishna gold is sufficiently coarse to command premium price at market. Although several of the miners interviewed used

TABLE 7.- PLACER CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS.

Stream Segment[1]		Deposit				Pay	Est. in situ Resources	Mined	Residual[2] Resources in situ	Resource[3] Value in situ
		Length (ft)	Width (ft)	Depth (ft)	Vol. (MBCY)	(oz./cy)	(oz)	(%)	(oz)	($)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KANTISHNA HILLS STUDY AREA										
Eureka Ck, upper,	SC	10,560	100	4	156.4	0.010	1,565	50	977	563,000
	B	10,560	40	3	46.9	0.008	375	0	375	
mid,	SC	5,280	100	9	176.0	0.028	4,930	50	3,080	1,284,000
	Sl	5,280	100	4	78.2	(0.020)	1,564	0	1,565	
mouth,	SC	2,560	150	20	284.4	0.022	6,258	80	2,500	1,302,000
	Sl	2,560	100	3	28.4	0.022	626	0	625	
Friday Cr, upper,	SC	2,560	30	5	14.2	0.044	625	50	390	5,378,000
	B	2,560	300	10	284.4	0.044	12,515	0	12,515	
mid,	SC	2,560	30	7	19.9	0.020	400	75	175	19,409,000
	B	2,560	630	42	2508.0	0.020	50,160	10	46,398	
mouth,	SC	1,320	200	12	117.3	0.021	2,465	25	2,000	7,231,000
	B	1,320	460	40	899.6	0.021	18,890	25	15,350	
Slate Cr, all		2,640	50	3	14.7	0.025	370	0	370	154,000
Eldorado Cr,	SC	7,920	80	9	211.2	0.020	4,225	5	4,065	2,428,000
	Sl	7,920	100	4	117.3	0.015	1,760	0	1,760	
Spruce Cr, upper, all		2,640	200	5	97.8	0.011	1,075	10	935	390,000
lower, all		6,600	660	12	1936.0	0.011	21,300	50	13,300	5,542,000
mouth, all		1,320	660	33	1064.8	0.0025	2,660	0	2,660	1,109,000

See footnotes at end of table 7.

TABLE 7.- PLACER CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment[1]	Deposit				Pay	Est. in situ Resources	Mined	Residual[2] Resources in situ	Resource[3] Value in situ
	Length (ft)	Width (ft)	Depth (ft)	Vol. (MBCY)	(oz./cy)	(oz)	(%)	(oz)	($)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KANTISHNA HILLS STUDY AREA (Cont.)									
Rainy Cr, upper, all	6,660	200	5	246.7	0.010	2,470	0	2,470	1,030,000
lower, SC	3,960	660	22	2,129.6	0.008	17,035	15	15,120	16,629,000
B	3,960	660	32	3,097.6	0.008	24,780	0	24,780	
Glen Cr, E. Fork, SC	6,600	100	4	97.8	0.018	1,760	30	1,365	6,274,000
B	6,600	560	10	1,368.9	0.010	13,690	0	13,690	
W. Fork, SC	6,600	100	4	97.8	0.018	1,760	0	1,760	6,439,000
B	6,600	560	10	1,368.9	0.010	13,690	0	13,690	
Frk Jct, All	660	500	60	733.3	0.028	20,530	25	16,680	6,951,000
lower, SC	5,940	100	12	264.0	0.021	5,545	50	3,465	5,020,000
Sl	5,940	600	5	660.0	0.013	8,580	0	8,580	
Willow Cr, upper, all	6,600	50	4	48.9	0.001	50	0	50	21,000
lower, all	6,600	660	12	1,936.0	0.001	1,940	0	1,940	808,000
Moose Cr, Spruce to Glen SC	6,600	400	12	1,173.3	0.0025	2,930	0	2,930	3,407,000
B	6,600	260	33	1,097.3	0.0025	5,245	0	5,245	
Glen to Rainy, SC	17,160	500	12	3,813.3	0.004	15,255	0	15,255	10,554,000
B	17,160	160	33	3,355.7	0.003	10,070	0	10,070	
Below Rainy, SC	9,250	600	12	2,466.7	0.008	19,735	0	19,735	8,866,000
B	9,240	60	25	513.3	0.003	1,540	0	1,540	

See footnotes at end of table 7.

TABLE 7.- PLACER CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment[1]		Deposit				Pay	Est. in situ Resources	% Mined	Residual[2] Resources in situ	Resource[3] Value in situ
		Length (ft)	Width (ft)	Depth (ft)	Vol. (MBCY)	(oz./cy)	(oz)	(%)	(oz)	($)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
KANTISHNA HILLS STUDY AREA (Cont).										
Moose Cr,										
Eureka to Friday, all		6,600	660	15	2400.0	0.010	24,000	20	20,570	8,573,000
Jauhola Group	SC	700	100	3	7.8	0.023	178	5	165	40,175,000
	B	1,320	3,800	35	6502.2	0.016	104,035	5	96,235	
Yellow Cr,	SC	5,280	100	4	78.2	0.010	782	50	490	4,586,000
	B	5,280	560	12	1314.1	0.008	10,515	0	10,515	
Glacier Cr, upper	SC	26,400	50	4	195.6	0.030	5,865	50	3,665	14,240,000
	B	26,400	130	12	1525.3	0.020	30,505	0	30,505	
lower,	SC	14,520	170	4	365.9	0.030	10,970	50	6,855	31,769,000
	B	14,520	430	15	3468.7	0.020	69,375	0	69,375	
		2,640	660							
Caribou Cr, upper	SC	25,740	150	5	715.0	0.019	13,585	40	9,510	119,459,000
	B	25,740	510	30	14586.0	0.019	227,134	0	27,134	
mid	SC	21,780	160	5	645.3	0.015	9,680	60	5,325	12,305,000
	B	21,780	500	12	4840.0	0.005	24,200	0	24,200	
lower	SC	21,120	200	5	782.2	0.025	19,555	20	16,620	74,171,000
	B	15,840	660	12	8964.3	0.018	161,355	0	161,355	
		21,120	460	12						
TOTAL KANTISHNA HILLS STUDY AREA: PLACER CLAIMS										$416,067,000

See footnotes at end of table 7.

TABLE 7.- PLACER CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment[1]	Deposit				Pay	Est. in-situ Resources	% Mined	Residual[2] Resources in situ	Resource[3] Value in situ
	Length (ft)	Width (ft)	Depth (ft)	Vol. (MBCY)	(oz./cy)	(oz)	(%)	(oz)	($)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
DUNKLE MINE STUDY AREA									
Colorado Cr, upper SC	5,280	50	2	19.6	0.005	98.0	25	80	196,000
B	5,280	200	2	78.2	0.005	391.0	0	391	
lower SC	6,600	100	6	146.7	0.005	734.	25	595	350,000
B	6,600	200	1	48.9	0.005	245.	0	245	
mouth, all	1,320	660	12	387.2	0.008	3100.	15	2750	1,146,000
TOTAL DUNKLE MINE STUDY AREA: PLACER CLAIMS									$1,692,000

1. abbreviations: SC, stream channel; Sl, slope; B, bench
2. assume 75% recovery rate of previous workings
3. gold valued at #416.75 (July 1, 1983)

Note -

SC = Stream Channel
Sl = Slope
B = Bench

different size limits in describing their gold, the current local buyers' classes were used. They are:

Nugget gold - retained on 4 mesh screen
Jewelry gold - retained between 16 and 4 mesh screen
Fine gold - passes 16 mesh screen

"Smelter gold" is the term locally used for any gold to be sold to a smelter, and whose value, therefore, is strictly based on actual weight of gold and silver present. Normally only fine gold, retort sponge, and coarse pieces stained by amalgam are sold as smelter gold or treated with acid and polished for the jewelry use. Local buyers offer 96 to 99% of the London afternoon fixing based on assay with 5 to 14 day pay off. Demand for more rapid payoff decreases the price.

Coarse gold, jewelry and nugget gold, can generally be marketed at spot price based on simple weight irrespective of assayed gold content. The market value for nugget gold is difficult to predict. Aesthetically pleasing nuggets, which commonly have significant amounts of intergrown quartz, sell for up to $1000/oz approximately 2.5 times spot prices which reflect subjective values of the buyer rather than the actual gold content or spot price.

It was assumed that the seller of Kantishna Hills Dunkle study area gold would seek the highest prices.

Accordingly, the following pricing assumptions were used:

Smelter gold price: At 99% of the London afternoon fixing (spot) adjusted for fineness in lieu of lot by lot analyses plus the value of the silver content.

Jewelry gold price - At spot price by simple unassayed weight.

Nugget gold price - At 1.5 times spot by simple unassayed weight.

Original resource in place (oz/BCY) (9): This element is the product of factors 6 and 7, that is, the unit value of smelter, jewelry, and nugget gold in oz/BCY.

Extent of previous mining (11): An estimate was made of the percentage of volume of the various placer deposits (bench, stream, slope) which were previously mined. The knowledge of the operators and owners was particularly valuable in ascertaining the extent of former mining operations in areas with surface disturbance, such as the Kantishna airstrip and the mouth of Eureka Creek, which appeared to be previously mined. Where previous mining has occurred, it has been generally confined to the stream channel with little or no processing of bench materials or of the small lateral embayments along the streams. Along many of the streams these benches and small side pockets of channel gravels remain unmined.

Recovery factor of previous mining (12): The most difficult factor to establish was the efficiency of previous operations. Assessment of recently mined ground was possible in some cases by observing the current operations of those same miners. Operations occurring many years ago and the cumulative effects of several operations on some stream segments were determined by comparing the values from apparently unmined ground with those reported from the worked ground. The original recovery of coarse gold at these older workings was generally much higher than for the finer gold.

Remaining resource (oz/BCY)(13): A computation based on the placer volume and unit value of each market class of gold and silver adjusted by the recovery factors of any previous mining.

Recovery factors for future mining (15): Recovery factors for future mining were generated assuming optimal equipment and recovery practices.

The recovery factors are based on equipment and techniques best suited to the particular stream segment and reflect working space, presence of boulders, water supply, access, and other criteria.

DESCRIPTION OF PLACER DEPOSITS

Subsequent to the field investigation, air and ground photos were analyzed and published and unpublished reports were

studied to aid valuation. Additional conversations with Bureau personnel verified and supplemented field observations.

This information was incorporated with the field observations and is tabulated in the next subsection of this report. The following stream segment descriptions are keyed to figure 6 and 7 and provide a characterization of each placer stream investigated.

Kantishna Hills Study Area

EUREKA CREEK

Eureka Creek is known for its coarse gold and produced a 32 oz nugget, the largest nugget found in the district to date.

Above Iron Gulch, the 100 ft wide stream channel placer is fairly uniform and has been mostly worked in the lower two-third of the segment. There are narrow (30 ft), thin (3 ft) bench placers, but the data given include a large colluvial fan at the mouth of Lucky Gulch. Although pockets up to 0.225 oz/BCY are reported, Bureau test pits indicate 0.008 oz/BCY. There is abundant water, good accessibility, little vegetation, and few boulders exceeding one foot in diameter.

The mid segment of the creek is in a deeply "V"-shaped gully with a locally very narrow channel. This is generally a slope wash placer rather than well developed benches. Thick alder, the narrow valley, steep slopes, and the abundance of 3 ft diameter boulders hinder mining. Although test pits of 0.052 oz/BCY are reported, the average value is believed to be 0.028 oz/BCY. The Water Level Lode Claims occur in this

segment. Although worked for coarse gold, most of the finer gold apparently remains in these claims.

Near its mouth, Eureka Creek broadens to a 100 to 200 ft plain that has been extensively worked. Most remaining values lie on the steep and thickly vegetated valley sides which have been evaluated 0.022 oz/BCY.

FRIDAY CREEK

Friday Creek is rich in coarse gold, with exceptionally large and rough quartz-bearing nuggets. The narrow, upper 1/2 mile of the creek has been the site of a booming operation which apparently recovered only the coarsest gold. The uppermost claim lies in the southern fork of the creek.

The middle segment has a narrow stream channel between thick benches with values at 0.020 oz/BCY. Although the stream channel was mined, recovery of fine gold has been apparently low. Current operations are working the bench to bedrock at 40 ft.

Operating on a five acre area near the mouth of the creek the miner, Leonard "Sonny" Kraegness recovered over 3200 oz of .720 fine gold during the past one and one-half seasons from ground averaging 0.021 oz/BCY. The remaining three-quarters of this claim appears just as minable but has been left unmined at the discretion of the claim owner.

SLATE CREEK

Slate Creek is a narrow creek in a steep valley with little slope or bench placer. The area is thickly forested and boulders to 4 ft diameter are common. The deposit is thin, and poor with individual Bureau samples showing trace amounts of gold. The segment has been prospected but not worked.

ELDORADO CREEK

Eldorado Creek and adjacent creek bottomlands, average about 50 ft wide, but there are areas of up to 300 ft in width at the junctions with tributaries. Although there are some possible slope placers, there are also areas of talus contributing boulders of up to 4 ft diameter to the stream. The area is thickly forested and large boulders are abundant. The mineral values are high, ranging from a trace to 0.07 oz/BCY. There has been little previous mining. Claimant Dan Ashbrook has prepared a large area for mining and has equipment on site.

SPRUCE CREEK

In its upper segment the combined stream channel and bench placers average 200 ft wide and 5 ft thick, with little evidence of previous mining. Downstream at about claim S6, as mapped, the stream spreads onto the old, elevated Moose Creek terraces and makes these claims minable to full width in 0.0025 oz/BCY ground. Near the junction with Moose Creek, the deposits thicken abruptly to 33 ft. There is abundant water and few boulders of consequence, but gummy clay was

observed at Robert O. Lister's operation on ground leased from Dan Ashbrock.

RAINY CREEK

In its upper segment Rainy Creek is a broad stream deeply incised into a wide canyon. The placer deposit is broad (200 ft), thin (5 ft) and evaluated at 0.01 oz/BCY, mostly in fine gold. About 3/4 mile upstream from its mouth, the stream runs onto the old and elevated Moose Creek terraces. These are thick (22 to 33 ft) but with modest value (0.002 to 0.007 oz/BCY) according to the Bureau. Water is adequate and boulders greater than 1 ft in diameter are rare. The channel areas of the lower creek segment have been and are being mined.

GLEN CREEK

The deposit along the East and West Forks of Glen Creek are quite similar, a 100 ft wide deposit about 4 ft thick evaluated at 0.018 oz/BCY, with adjacent 10 ft thick benches to full claim width at 0.01 oz/BCY. Mining is currently in progress on the East Fork by Glen Creek Mining Co., which is leasing the ground at a reported 25% plus undisclosed cash bonus from the claimant, Gold King Mines of Anchorage, Alaska. The West fork placers are unmined.

At the junction of the forks, there is an abnormally great thickness of gravel associated with water-worn bedrock. This is believed to be an old waterfall "souse hole." At the time of inspection, this pocket had been opened to a depth of 40 ft with bedrock anticipated at 60 ft.

The lower segment of claimed ground on Glen Creek is still high in the stream valley, but there is full claim width placer deposits at 0.021 and 0.013 oz/BCY in the channel and benches.

The 15 claims on Glen Creek have reportedly been offered to the Glen Creek Mining Co. for $3.2 million.

WILLOW CREEK

The placer deposit of the upper segment of Willow Creek is confined to the narrow (50 ft) stream channel. Downstream the creek flows onto the Moose Creek terraces which have full claim width placer to 12 ft but values are modest (0.001 oz/BCY).

MOOSE CREEK

Upstream of the Kantishna townsite, Moose Creek occupies a wide valley marked by a series of alternating 3 ft and 12 to 20 ft terraces. The stream channel placer is reported to be 10 to 15 ft thick, and lies above a blue, glacial (?) clay or false bedrock. The adjacent benches are up to 33 ft thick. The area of minable ground is broad and flat, generally sparsely forested with few boulders greater than 1 ft in diameter. Values are modest (0.0025 to 0.004 oz/BCY at Bureau test pits). The creek has been divided by deposit characteristics and test pit results into segments broken at the mouth of the major tributary streams.

The segment between Eureka Creek and Friday Creek is a broad gravel flood plain which, although disturbed at the surface,

has not been extensively mined. There are reported to be 15 ft of gravel at 0.01 oz/BCY above the false bedrock. There are reports of similar values in the gravels below this false bedrock. There is an abundance of water, excellent access, and few boulders.

The Jauhola Claim Group is treated as a segment unto itself. It consists of three side-by-side claims oriented north-south. The block includes the segment of Moose Creek passing through a narrow gorge. Although thin, the channel deposit is rich (0.023 oz/BCY) according to the Bureau. Most of the claimed area lies on a high terrace above the creek which has about 35 ft of gravel at 0.016 oz/BCY beneath 8 ft of organic soils. There has been little mining.

YELLOW CREEK

The thin (3 ft) 100 ft wide stream channel placer at 0.010 oz/BCY has been recently mined, but with apparent low recovery of the fine gold fraction. The broad benches remain virgin at 0.008 oz/BCY. The entire surface of the channel placer has been greatly disturbed; a significant percentage of unmined channel placer has been buried beneath tailings. The area has adequate water and few boulders over 1 ft in diameter.

GLACIER CREEK

The claimed area on Glacier Creek extends both upstream and downstream by a mile more than is indicated in the National Park Service's 1981 draft environmental impact statement for Denali National Park and Preserve. This is, in part, due to

the shape of the "GA" claims group which are 2640 x 660 ft not 1320 x 1320 ft.

In accordance with the wishes of the operators, the creek was not traversed, but rather was inspected only from the air. The segment upstream of Eighteen Gulch is narrow, with a narrow (50 ft) and thin (4 ft), but rich (0.03 oz/BCY) channel placer and a broad (130 ft), thick (12 ft) rich (0.02 oz/BCY) bench. The stream channel placer appears to be about half worked over, but the benches show only signs of test pitting and trenching.

Downstream from Eighteen Gulch, the channel placer fluctuates greatly in width but averages 170 ft. It is of similar thickness (4 ft) and value (0.030 oz/BCY) than the area upstream while the bench broadens to full claim width.

CARIBOU CREEK

The claimed area upstream of Last Chance Creek has a broad (150 ft), thin (5 ft) stream channel placer deposit and bench placer of full claim width which runs 0.019 oz/BCY. This is mostly fine gold at only .670 fineness, which technically makes it the mineral variety "electrum." Although there are narrow places in the channel, the benches provide working space and access. There is adequate water and few boulders greater than 1 ft diameter.

The middle segment of Caribou Creek, from Last Chance Creek to a distance 5 miles downstream, is similar to the upstream segment but with a slightly different volume due to the greater ratio of stream channel to bench deposit and slightly

greater extent of previous mining activity. This area was previously mined by the Carrington Company, whose methodical tailings placement indicate careful planning and thorough utilization of the ground through virgin ground may have been covered.

The lower segment of Caribou Creek, which extends further downstream than shown in the Denali draft environmental impact statement, has a 200 ft wide channel placer deposit about 5 ft thick running 0.025 oz/BCY. Much of this ground remains unworked as evidenced by patches of mature spruce forest.

To the east of the creek is the Lee Bench, an extensive bench placer running 0.018 oz/BCY of which about 450 acres are claimed. It is reported that the six Howtay Bench Association claims which cover approximately 240 acres of the Lee Bench, have been subject of recent sales negotiation at a price in excess of $3 million.

Dunkle Mine Study Area

COLORADO CREEK

The claims in the upper and middle segments of Colorado Creek in the Dunkle Mine study area are in such a narrow, deep, steepsided canyon that even small scale mechanized mining would be difficult. Boulders to 4 ft lie in the generally 3 ft thick channel placer. Earl Foster, claimant, reports that the channel receives flood gold in sufficient quantities to allow suction dredging at 2 to 3 year intervals. Bureau testing in 1983 showed 0.005 oz/BCY. The slope wash below

the known gold bearing dikes in the canyon walls are believed to have similar values and be the source of the flood gold.

The area under claim at the mouth of the creek is on the floodplain of the West Fork of the Chulitna River. Drift miners at the turn of the century reportedly recovered $15 to $18 per bedrock square yard from beneath 12 to 15 ft of gravel and soil. Bureau test pits in 1983 ran 0.008 oz/BCY.

PLACER RESOURCE ESTIMATES

Estimated resource volumes and estimated resource value in situ were calculated with two levels of detail. The first level accounted for the volume of pay material left in the ground (BCY), the estimated pay (oz/BCY) for each stream segment, and the extent and influence of previous mining. The value of gold was set at $416.75/oz (July 1, 1983). Results are displayed by stream segment in table 7. The estimated placer resource value in situ for Kantishna Hills study area is approximately $416 million and that of the Dunkle Area approximately $1.7 million. Values ranged widely by segment, from a low of $21,000 for upper Willow Creek to estimated in situ values in excess of $119 million in upper Caribou Creek.

The second level of detail involved a larger number of assumptions, based on interviews and literature, and differentiated among market classes, recovery factors by class, and values of market class (July 1, 1983). Results are presented in appendix E. The differences in value between the two approaches is 26.5% and explainable by considering potential recovery. Appendix E factors a recovery percentage for each market class of mineral. This ranged from 70 to 90%. In

table 13, the table 7 data is modified by assuming a recovery factor of 85%. Approximately 15% of the variance, therefore, is and will be accounted for by incorporating recovery factors. The remaining difference of approximately 10% is influenced by the inclusion of fineness assumptions in appendix E. These ranged from .650 to .900 fine for various stream segments. The effect of this variance on the valuation of the mining claim is small compared both to the resultant present worth after accounting for mining costs and to the estimates on the volume of deposits.

LODE CLAIMS

Field reconnaissance for this study included visual inspection by air and foot of the area of the lode claims. Insufficient time and deficient staking of the claims precluded specific identification of claims. This inability to identify the boundaries of claims had little effect on inferred resource calculations as those computations were based on previous sampling as reported in the literature and on the summer field investigations of the Bureau and Salisbury & Dietz, Inc.

There were several important data sources used in developing the DOWL/PLANgraphics estimates of in situ lode resources. Of the published material, Bundtzen (1983) and Bundtzen (1981) were the most frequently referenced. Bundtzen (1981) compiled the results of previous sampling by Hawley (1977), Seraphim (1961), Bundtzen and others (1976), the Bureau (multiple dates), and Davis (1922) among others. Bundtzen also frequently noted Chadwick (1977).

DESCRIPTION OF LODE RESOURCES

East of the Quigley-Alpha Ridge silver lode system lies the Red Top Mining, Co.'s gold lodes in the Banjo lode gold system apparently part of the same vein system as the Quigley Ridge silver ores. The Banjo system consists principally of gold ore associated with silver, tungsten and minor amounts of lead, antimony and zinc. Generally these minerals occur in a carbonate quartz-rich vein. Arsenopyrite content varies throughout the system. Again, the ore horizon appears to be confined by the Spruce Creek sequence.

The Quigley Ridge - Alpha Ridge silver vein system extends west of Moose Creek from Alpha Ridge northeasterly along Quigley River to the north flank of Wickersham Dome. The mineralogy of these deposits consists of galena, sphalerite, tetrahedrite, siderite, and in some cases, other sulfides and sulfosalts. The sulfosalts and galena appear to contain most of the silver values. Generally these minerals occur in massive sulfide-rich lenses. Ore horizons appear to be stratigraphically confined within the Spruce Creek sequence.

In 1903, placer gold was found by Judge James Wickersham in Chitsia Creek. In 1904, Joe Dalton located placer gold claims on Checked Creek. In 1905, Joe Dalton discovered coarse placer gold on Eureka Creek and Joe Quigley discovered coarse placer gold on Glacier Creek. After 1905 mining on the creek diminished.

Discovery of the lode deposits occurred in 1905 and by 1919 numerous mineralized vein deposits had been located in the region. In the 1920's, mining was active on Quigley Ridge.

In the late 1930's and early 1940's, mining moved up the ridge to the Banjo Mine.

In the Kantishna Hills study area six individuals or companies own the patent lode claims while one individual owns the valid unpatented lodes. Eleven individuals or companies own the unpatented placer mine claims. A lode mine was observed in operation (Begich) during this study and a second operation (Millhouse) operated on Slate Creek early in the summer.

Lode exploration work was being conducted by Nick Begich, Jr. on the Silver King #18 claim approximately 1 mile due east of the Banjo Mine. The claim is owned by Gold King Mines, Inc. of Anchorage, Alaska.

During the summer of 1983 Begich and his partner shipped up to 150 tons of hand cobbed ore from a 5 ft by 5 ft by 30 ft trench. Samples of the ore ran up to $3,000 per ton. Mineralization occurs in "poddy", irregular broken quartz veins and was highly oxidized near the surface. Massive galena and tetrahedrite were observed along with malachite and azurite.

The only active lode mining in the Dunkle Mine study area has been for coal which was mined from 1941 through 1954. From 1911 to 1915, the area was prospected for gold and again in the 1960's and 1970's, but neither placer or lode mining has started in the area.

LODE RESOURCE ESTIMATES

During the 1983 field season, the Bureau of Mines collected and subsequently analyzed a over 300 rock chip samples. The contractor drilled 22 holes with varying success at core recovery and location of principal deposits. The results of the 1983 investigations comprised the bulk of the unpublished material available for the valuation of the claims.

Despite the 1983 field investigations, no on-claim sampling in any form was not available for 11% of the 39 claims being studied, and the valuation of only 6 claims was aided by core information. The shortage of samples on and adjacent to the claims under investigation and in particular, the paucity of subsurface data and cores were distinct constraint to the valuation estimation. In many cases inferred resources were limited to estimates based upon information derived from adjacent claims. Those estimates were discounted as discussed below to reflect the additional uncertainty.

Inferred resources in situ were estimated based on published or approximated values for length, width, and depth of the principal mineral concentrations. Bundtzen (1981, 1983) was a prime source of this information. Half square techniques were applied to the strike length to approximate depth, consistent with Bundtzen (1983). Where this information was not available, similar information was obtained from an adjacent claim and reduced by 50%. In those cases where several claims were adjacent or proximate, a sphere of influence was developed, appropriate averages made, and the resultant value reduced by 50% to account for the uncertainty.

Volumetrics were calculated from the physical parameters and tonnages estimated based upon an average volume:weight factor from Bundtzen (1983).

Ore concentrations were estimated from the various sources available to DOWL/PLANgraphics. A series of decision rules were established to insure consistency in approach in making these estimations. Where samples existed on or proximate to the claim under consideration, the following procedure was followed.

1. Multiple core and other samples: use core data, drop highest and lowest values based on gold concentrations, and average balance

2. Single core samples: compare core and channel samples (if any) and use the most "reasonable." If other samples are chip or grab, disregard and use core.

3. Multiple channel and other samples: use channel samples, drop highest and lowest values based on gold concentrations and disregard other samples.

4. Single channel and other samples: select channel.

5. Multiple grab or chip samples: drop highest and lowest values based on gold values; average remaining samples.

6. Soil samples only: use sphere of influence approximations based on adjacent claims.

The procedure for estimating ore concentrations principally involved reviewing available data from the 1983 field investigations and Bundtzen (1981). Approximations were required on 11 of the 39 claims.

Resource value in situ was estimated by calculating the inferred resources (reference appendix F) and applying July 1, 1983 metal prices. These were: gold, $416.75/oz; silver, $11.63/oz; lead, $.22/lb.; and zinc, .40/lb.

Table 8 summarizes the estimated reserves, quantity of ore by metal, and estimated in situ resource value. Appendix F presents the details of the estimation for each lode claim. This appendix is accompanied by a series of footnotes identifing the samples used.

The estimated resource value in situ for patented lode claims is $295,015,000 and for unpatented $45,330,000. These totals are strongly influenced by the sketchy sampling data available. The total aggregate for the study area can be considered to have a higher validity than the component values, that is, values estimated for each claim.

TABLE 8.- LODE CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS

NPS Claim Number	Claim Name	DOWL/PLANGRAPHICS					
		Estimated Resources (T)	Silver (oz)	Gold (oz)	Lead (lb)	Zinc (lb)	Resource Value In Situ ($)
		(1)	(2)	(3)	(4)	(5)	(6)
KANTISHNA HILLS STUDY AREA: PATENTED LODE							
1.	Whistler	650	5,300	35	103,000	400	98,000
2.	Bright Light	(70)	(200)	--	(3,400)	(1,300)	(5,000)
3.	Lucky Strike	3,900	31,800	200	--	--	450,000
4.	Galena	7,900	335,800	600	465,800	1,175,300	4,742,000
5.	Red Top	20,400	2,277,000	7,500	6,693,500	2,693,800	32,183,000
6.	Star	g-1	--	--	--	--	--
7.	Friday	g-1	--	--	--	--	--
8.	Martha Q.	7,500	320,000	2,300	4,995,000	1,005,000	6,160,000
9.	Pollywonder	g-1	--	--	--	--	--
10.	Gold Dollar	22,000	271,200	4,000	35,300	621,800	5,065,000
11.	Golden Eagle	5,300	386,700	1,700	1,599,900	--	5,555,000
12.	Francis	470	7,700	200	35,000	--	167,000
13.	Little Maud	20,000	173,400	1,600	168,000	172,000	2,789,000
14.	Little Annie	90,000	530,100	8,100	7,470,000	621,000	11,433,000
15.	Little Annie #2	g-2	--	--	--	--	--
16.	Silver Pick #2	g-3	--	--	--	--	--
17.	Silver Pick	169,400	7,937,000	30,500	10,334,000	25,960,000	115,328,000
18.	Darling	g-3	--	--	--	--	--
19.	White Hawk	23,800	196,300	500	9,881,800	5,717,500	6,942,000
20.	Water Level	3,800	101,100	100	59,300	19,500	1,244,000
21.	Sulfide	1,900	300	150	4,000	3,800	68,000
22.	Keystone	26,600	5,200	16,300	26,700	6,000	6,850,000
23.	Pennsylvania	31,200	4,200	6,700	--	--	2,810,000
24.	Gold King	1,700	2,200	100	800	3,000	62,000

See footnotes at end of table 8.

TABLE 8.- LODE CLAIMS: ESTIMATED IN SITU RESOURCE VALUE
DOWL/PLANGRAPHICS. - (Continued)

NPS Claim Number	Claim Name	DOWL/PLANGRAPHICS					
		Estimated Resources (T)	Silver (oz)	Gold (oz)	Lead (lb)	Zinc (lb)	Resource Value In Situ ($)
25.	East Gold King	600	800	30	300	1,100	23,000
26.	Blue Bell	600	800	30	300	1,400	23,000
27.	Pittsburgh	2,100	150	150	3,000	1,100	64,000
28.	Doherty	(2,100)	(150)	(150)	(3,000)	(1,100)	(64,000)
29.	Merry Widow	(3,200)	(203,100)	(100)	(484,400)	(541,200)	(3,129,000)
30.	Silver King	5,600	313,300	100	967,500	843,800	4,242,000
31.	Jupiter-Mars	20,800	151,800	1,000	3,685,800	495,000	3,208,000
32.	Chloride	653,300	4,775,600	41,200	28,178,700	8,363,000	82,237,000
33.	Waterloo	800	1,100	20	182,700	1,800	63,000
34.	Chlorine	(500)	(50)	(25)	(200)	(100)	(11,000)
TOTAL KANTISHNA HILLS STUDY AREA: PATENTED LODE							$295,015,000
KANTISHNA HILLS STUDY AREA: UNPATENDED LODE							
A	RED 1	(29,800)	(2,277,400)	(7,600)	(8,040,600)	(1,965,500)	(17,307,000)
B	BANJO	45,000	23,400	20,700	855,000	126,000	9,137,000
C	HARDROCK	(111,500)	(813,900)	(5,600)	(19,756,000)	(2,653,500)	(17,196,000)
D	PASS	(5,600)	(1,500)	(1,300)	(54,000)	(7,900)	(571,000)
E	TUGBOAT ANNIE	(14,000)	(51,900)	(400)	(1,243,600)	(165,600)	(1,119,000)
TOTAL KANTISHNA HILLS STUDY AREA: UNPATENDED LODE							$ 45,330,000
TOTAL KANTISHNA HILLS STUDY AREA							$340,345,000

Notes -

g - grouped with adjacent claims; g-1 with Martha Q, g-2 with Little Annie, g-3 with Silver Pick
( ) - reserve estimates based on adjacent claims.
All totals affected by rounding.

SUMMARY OF SURFACE ESTATE APPRAISAL FOR PATENTED CLAIMS

THE MARKETPLACE

Three basic market groups were considered to appraise the surface estate of the patented claims (properties): the local and regional market, the statewide market, and the national and worldwide market. Each presented a different perspective on the use and value of the subject property.

The local and regional market (perhaps best described by a 100-150 mile radius around the Kantishna Hills study area) would be expected to reflect on regional value trends and uses as the basis for the value of the property. Uses would typically include recreational, homestead, investment, or possibly commercial. The population of the area is sparse and the general availability of land in the area is quite large, due to the state's land disposal program. This has an impact on the price paid by purchasers from this market.

The Statewide market would tend to be similar to the local and regional markets with a few notable exceptions. As a result of the larger population and economic base, greater personal purchasing power, and other influences, prices paid by a Statewide market would tend to be greater, visits to and use of the property would tend to be fewer, and the emphasis on speculation and investment value would be greater.

The national and worldwide markets are the most difficult to identify and consequently the most difficult to forecast.

This group might best be described as the "Wall Street Journal" market. The potential purchasers are from all over the world and most notably those areas or groups with whom Alaska is already a popular tourist or trade destination. Presently this group would include the Japanese, German, and Scandinavian countries, and American residents from the financial centers of the country: New York, San Francisco, Boston, Chicago, etc.

This third group is most sensitive to the influence of the location of the property inside the National Park, and would purchase solely from a speculative or preemptive motivation, that is "this may be the last opportunity anyone will ever have..." This market is considered the most affluent, and the prices paid by buyers from this group would have the least relationship to other Alaskan property values. The cost of marketing the property is, however, one important offset to the price paid by this market. Such a worldwide marketing campaign is very expensive and the marketing cost should be deducted from the market price.

Specific Assumptions

A number of assumptions affected the valuation analysis. They were:

1. Each parcel was assumed to have legal access, either by constructed road, or by easement. Constructed road access was assumed to be a dedicated right-of-way and easements providing access to a parcel without a constructed road were considered sufficient in size to build a single lane road.

2. In certain instances, subject claims have overlapping boundaries resulting from their original filing. In this study, attempt was made to distinguish among these parcels, or to decide which parcel had the earlier claim. Each parcel was assumed to contain a full 20 acre area.

3. Title to the property can be transferred by warranty deed, without restriction, other than the reservation of all subsurface rights.

4. While the holders of the property must comply with the management policies of the National Park Service, it was assumed that approvals for typical projects, such as new road construction, would not be unreasonably withheld.

5. Development must comply with all applicable State and Federal environmental requirements.

6. Commercial tour-related activities such as outings, hikes, etc., must be conducted outside the original Park boundary, consistent with present Park Service policy.

7. The Kantishna airstrip was assumed to be a public facility and available to all users.

8. Access through and over Denali Park and Preserve by air or road is guaranteed under Federal law and would not be diminished in future years.

Most Probable Use

As defined previously in Surface Estate Values - Patented Land, highest and best use, or most probable use, considered the physical, legal, political, and market constraints of a property, as well as surrounding development in the area. The most probable use was always expressed as of a time certain because all aspects of most probable use can change (though typically physical features remain the same).

The physical characteristics of the patented claims are important and have a tremendous influence on the type of facilities capable of being constructed to meet a market. As an example if the physical characteristics of the property restrict development to light frame construction, with limited water and sewer facilities, the developer desiring a hotel-type facility would not be interested in buying land in the Kantishna Hills study area.

Another important valuation aspect of physical characteristics was the residual value of land, when considered as part of a total property investment. If, for example, an expensive road project, or perhaps waste water control system, is required for the construction of a large hotel property, it offsets a possible gain in property value. It is quite conceivable that a simple lodge building could have the same residual land value as a major hotel property, due to the costs of site preparation, road access, and water, sewer and other utility costs of the more significant development.

Other potential most probable uses included recreational use, speculation, and homesite uses. While the possibility of a

major commercial use on one or more of the tracts was not denied, a mix of commercial, recreational, and speculative ventures was considered to be the probable use of the properties. In addition, site preparation and other development costs for a commercial use offset much of the premium that might be associated with this use, resulting in a land value approximately equal to that for recreational or speculative uses.

After consideration of basic physical features, the overriding influence on the most probable surface use of the patented claims was the influence on the market conditions by the Denali Park and Preserve visitor trade and, to a lesser degree, the Alaskan visitor trade. The strength or weakness of this market has the greatest potential to impact the value of the properties. The buyer responding to a demand for visitor facilities would pay the highest price for the property.

Based on the comments of a number of individuals in the area, there appears to be an increasing demand for tours of the Kantishna Hills mining area. However, once the present and reasonable future demand is met, commercial use of the properties is expected to be limited, and the values of the remaining parcels would decline or level out, until demand was again in excess of the supply of facilities. In effect, the commercial use of the properties is analogous to most resort locations, with economic activity and value trends subject to visitor traffic, facilities, and amenities offered.

MARKET SURVEY

Structure

After the field reconnaissance of the patented claims a telephone survey of three groups was initiated: Anchorage based realtors, Anchorage and Fairbanks based air-taxi and charter operators, and individuals who had obtained land from the State of Alaska land disposal program in the Healy, Andersen, and Clear areas (immediately north of the park boundary).

Realtors were selected because of their day to day contact with buyers and sellers, and for their active interest in land values. This group also has frequent contact with individuals looking for remote land requiring aircraft access.

Air-taxi operators were selected because of their involvement with the acquisition of remote lodge and camp settings and with customers who want the kind of outdoor experience that the Kantishna Hills study area can offer.

Land owners in the region were selected because of their general knowledge of the area and land values. By using State land disposal records, the survey was limited to individuals who had actively sought to buy land in the general area during the last 4 years.

A ten question telephone survey was developed, which included: general information about the valuation effort; a brief description of the property, including a careful explanation that only surface rights were considered; the location and

size of the parcels; access; topography; and available services. No attempt was made to include a complete listing of all limitations or benefits of the property in deference to a simple and direct questionnaire.

The following ten questions were asked:

1. How much would you expect to pay for the 20 acre parcel just described?

2. Does your guesstimate assume a cash sale or a sale based on purchase terms? Outline the purchase terms briefly.

3. Would you pay less if road access were not available but if the airstrip were? What if the airstrip weren't there but the road were?

4. Do you think the location of the property inside a national park is a good feature or bad?

   a. Does it add value to the parcel?

   b. How much less would you pay if the property were not in a national park?

5. Would you pay less if there were low-level mining activity in the area? How much less?

6. If you bought one of these parcels, regardless of the price, how would you use it? Some alternatives would be:

   Holding for investment
   Site for a recreational cabin
   Site for tourist lodge
   Homestead site
   Subdivide into two or three parcels and sell

7. If you could purchase one of these parcels and 5 of the 20 acres is used for a mining operation, would you pay less for the parcel if the miner agreed to restore the surface upon completion of the mining?

8. If you owned one of the parcels, how many times a year would you probably visit the property?

9. Would you pay more for the property if it were closer to Anchorage? How much more if the property were 200 miles closer to Anchorage?

10. Would you expect most buyers to fly to the property or drive?

Out of a total of approximately 320 potential contacts, a total of 41 surveys (13%) were completed, with telephone contacts made the weeks of October 3rd and 10th. Of the 41 respondents, 26 were real estate agents, 8 were air-taxi operators, and 7 were landowners in the regional area. Of the three groups, regional landowners were the most difficult to contact and the least cooperative.

Certain questions resulted in multiple answers, such as "$1,400 to $1,600 per acre." Each response was considered separately, resulting in a total response greater than 41 for some questions. Similarly, some respondents did not answer all questions. In these instances, only responses were considered. The survey did not use a "No Opinion" category. The following discussion summarizes the results of the questionnaire.

#1 - Price they would expect to pay

52 responses

Range of Responses:	$300/acre to $10,000/acre
Average Price:	$1,732/acre
Standard Deviation:	±$1,599/acre
Mode:	$1,000/acre 10 times
	$1,500/acre 8 times
	$2,000/acre 4 times
	$4,000/acre 4 times
	$500/acre 3 times
	$2,500/acre 3 times
	Other values 2 times or less

Note: The average price of responses by real estate agents was $1,599/acre.

#2 - Cash or Purchase Terms?

32 responses

26 terms = 81%
6 cash = 19%

#3 - Would pay less if road access were not available, but airstrip was?

40 responses

21 yes = 53%
19 no = 47%

- Would pay less if airstrip was not available, but road access was?

17 yes = 43%
23 no = 57%

#4 - Think that location of the property in national park is good or bad?

39 responses

22 good = 56%
16 bad = 41%
1 no difference = 3%

- Location in park adds value?

18 responses

11 yes = 61%
7 no = 39%

- How much less would you pay if property were located outside the park?

7 responses

Estimates for this question were erratic, with most answers "some," "somewhat," "a little," etc. There were three price responses: one deducting 15% or $150/acre, one deducting 50%, or $2,000/acre; and one proposed paying 15% more if the property were located outside of the park boundary.

#5 - Would pay less if low-level mining activity in area?

40 responses

26	yes	= 65%
14	no	= 35%

- How much less?

21 responses

Like #4 above, this question got as many narrative answers as numerical answers. Numerical answers ranged from 0% to 50% and from $300/acre to $1,800/acre.

#6 - Expected use?

48 responses

24	cabin	= 50%
13	commercial lodge	= 27%
9	investment	= 19%
2	subdivision	= 4%

#7 - Would pay less for parcel with reclamation agreement?

41 responses

29	yes	= 71%
12	no	= 29%

- How much less?

7 responses

Only 7 responses were received to this question and 4 answered they would pay "a little" less. One suggested deducting $100/acre and one indicated opposition to a purchase with this stipulation.

#8 - How many visits per year?

50 responses

Responses ranged from 0 days to 4 months each year. The average of the 40 numerical responses was 4.30 days, with the least number of days, 0, and the greatest 24. Air-taxi operators said "frequently."

#9 - If the property were located 200 miles closer, would you pay more?

35 responses

26	yes	= 74%
9	no	= 26%

(a)- How much more?

16 responses

Responses ranged from $120/acre to $2,000/acre, with the average increase of $650/acre and the standard deviation at $502/acre.

#10 - Would you expect most buyers to fly or drive to the property?

49 responses

22	drive	= 45%
27	fly	= 55%

SURVEY ANALYSIS

To a certain extent, the results of the survey were self-evident. The key question, "how much would you pay," was answered by all with a general concensus in the $1,000 to $1,500/acre value range, or, a total price of from $20,000 to $30,000 per 20 acre claim.

Purchase terms were indicated at this price. Accordingly, a cash price would necessitate a downward adjustment. Prior work in the Mat-Su Valley indicated that the cash versus terms adjustment ranges from 30% to 40%.

Questions 3, 4, 5, 7, and 9 all sought to identify the importance and/or premium of different influences affecting the property's value. Response to question 3 indicated that the airstrip is nearly equal in importance to the road as the primary access to the area. Further support was provided by the results of question 10; 55% indicated they expected people to fly to the area rather than drive. Not unexpectedly, land owners in the area cited driving for access more frequently than flying.

The impact of mining on property value, both in the area and potentially on the patented claims, was addressed by questions 5 and 7. Although open to interpretation, continued mining appeared not to be a significant deterrent to sales or value.

Only two respondents to question 6, concerning the expected uses, suggested "subdivision into two or three parcels and resale." This suggested that the 20 acre size versus a

smaller tract is about the size the market would desire. This was also indirectly supported by responses on parcel price (that is, $20,000 to $30,000 per claim), an amount that is consistent with the purchase price of other recreational and investment properties by a sole owner.

The number of respondents who considered the location of the property inside the park "bad" was significant: 41% of the sample. Apparently the individuals were responding to a perception of restrictive federal land policies.

In terms of the reliability of the data, real estate agents were given greater credibility. The survey was in fact, unintentionally but consistently biased by the number of respondents in the real estate business: a result of easier telephone contact with this group. If this survey were to be expanded, a mail-out survey with some kind of "carrot" to encourage participation, would result in a greater response by landowners in the region. The benefit is questionable, however, because the real estate agent's opinion factor the many contacts with buyers and sellers with differing expectations. The agent is, in this case, a short cut to the larger market group.

The response of the air-taxi operators, as a group, was significant because of their immediate appreciation for the commercial potential of the parcels. However, their answers varied little from those of the agents or the group as a whole.

Other Indications of Value

In the course of estimating a surface estate value for the patented claims, other indications of value from a variety of sources were also considered.

While not fully or separately confirmed, there was one private sale of a 5 acre homesite in the Kantishna Hills study area in the past 8 years. A parcel near Camp Denali was purchased by the owners of the camp for a reported price of $11,000/acre. They admitted their motivation was to stop another competitor from coming into the area.

Mr. Leo Mark Anthony, a mineral property owner in the Kantishna Hills study area, opined that the value of the surface rights to his claims patented lode claims (17 of the 34) ranged from $5,000 to $10,000/acre. While he did not offer further substantiation, he claimed that one parcel had an interested party at $11,000/acre for the surface rights only.

Fly-in waterfront properties in the Susitna Valley are presently sold for $3,000/acre and more, subject to physical features and location relative to Anchorage. In the Skwentna area, about 90 miles by air from Anchorage, an area inaccessible by car, waterfront acreage parcels (typically 5 acres) now range from $4,000 to $7,000/acre. During the same period, the State of Alaska has made many non-waterfront parcels available at prices from $1,000 to $1,500/acre. There has been little interest in these properties.

A recent appraisal for a 10-acre highway frontage parcel at Montana Creek, 90 miles north of Anchorage and by highway, and ideal for a commercial roadhouse, bar, camper park, etc. brought a value of $8,000 per acre. Sales of similar highway parcels ranged from $3,000 to $7,000/acre, on a terms basis.

ESTIMATED MARKET VALUE

In reaching a value conclusion, the greatest emphasis was placed on the results of the survey, the average value of $1,700/acre. There was some support for this value estimate from other sales activity with the assumption that the combination of road and air access and the National Park location adds a premium of about 100%. In other words, if the property had no direct road or air access and was not in the Park, a value of about $600 to $900/acre would be anticipated. This amount is generally supported by comparables presently available.

Based on the assumption that an acquisition of the claims would be with full payment in cash, the value estimate must assume a cash sale. The estimate of $1,700/acre was based on a terms sale, and downward adjustment was necessary.

After completion of the survey, discussion with many knowledgeable individuals and review of other sales data, the project team concluded that a value range that is slightly in excess of that indicated by the survey was appropriate. The base price per acre for a claim on terms was set at $2,000/acre, which adjusts to $1,500/acre on a cash basis. There was, of course, a range of values around this estimate.

This value estimate applied to the "best" parcels. Downward adjustment was required for those parcels which do not have all the amenities of road access, mild slopes, Mt. McKinley view, good building sites, etc. Table 9 summarizes the physical features of each patented claim which were the basis for adjustments to the average $1,500/acre value. For comparison, each claim has been assigned a rating of 1 to 5, representing the overall desirability of the parcel for development.

The value estimates are preliminary only. A very thorough investigation would be required to stand as sufficient evidence of value for a taking of the surface rights under eminent domain. The full appraisal of the surface rights would be an extremely lengthy and complex task, and would no doubt take many months to complete.

There remain many unanswered questions regarding the legal boundaries of the parcels, status of road and park access, etc. which were mentioned previously. Prior to beginning a full appraisal, these issues would have to be resolved in order to stand court scrutiny. Even under those circumstances, the value of the surface rights of these parcels would not be known with certainty unless they were exposed to the market.

The value estimates which follow are based solely on the research and investigation that has been described. The adjustments made to the base value are the result of the project team's experience with other recreational land valuations and the relative impact on price of each amenity. Table 10 sets forth estimates on the surface estate value for

TABLE 9.- PHYSICAL FEATURES: KANTISHNA PATENTED LODE CLAIMS.-

Claim Number Claim Name	1 Whistler	2 Bright Light	3 Lucky Strike	4 Galena	5 Red Top	6 Star	7 Friday
Road Access	none possible	none possible	road bisects	nearby	bisect prop.	road bisects	road bisects
Slope/Topo	steep	steep	steep	steep	moderate, bench	steep	steep
Creekfront	none	none	MooseCr	none	none	none	none
Groundcover	rock	rock	trees, shrubs	trees, shrubs	shrubs, trees	shrubs, trees	shrubs, trees
View	north, east	north, east	to west	to west	north, west, south	Friday Cr.	Friday Cr.
Building Sites	none	none	two, max	none	four	two-three	three
Exposure	north, east	north, east	to west	to west	west	to north	to north
Evidence of Mining	none	none	none	none	tailings	none	none
Overall Ranking	1	1	3	2	5	3	3

1 = Poor
2 = Fair
3 = Avg.
4 = Good
5 = Best

TABLE 9.- PHYSICAL FEATURES: KANTISHNA PATENTED LODE CLAIMS.-
(Continued)

Claim Number	8	9	10	11	12	13	14
Claim Name	Martha Q	Polly Wonder	Gold Dollar	Golden Eagle	Francis	Little Maud	Little Annie
Road Access	yes	yes	road bisects	road bisects	yes	yes	yes
Slope/Topo	steep	steep	steep-moderate	moderate-steep	moderate-steep	moderate-varies	moderate-varies
Creekfront	none	none	none	none	none	none	none
Groundcover	grasses, rock	grasses, rock	grasses, shrubs	shrubs, trees	grasses	rock, grasses	rock, grasses
View	Moose Cr	Friday Cr	down Friday Cr	360'	360' south	360'	to north, Friday Cr
Building Sites	two	two	two	two	four	three	three
Exposure	to north	to north	to north, west	to west	north, south, west	360'	360'
Evidence of Mining	slash line	none	none	none	none	some tailings	some tailings
Overall Ranking	3	3	3	3	5	5	5

1 = Poor
2 = Fair
3 = Avg.
4 = Good
5 = Best

TABLE 9.- PHYSICAL FEATURES: KANTISHNA PATENTED LODE CLAIMS.-
(Continued)

Claim Number	15	16	17	18	19	20	21
Claim Name	Little Annie #2	Silver Pick #2	Silver Pick	Darling	White Hawk	Water Level	Sulfide
Road Access	road may cross	possible-difficult	possible side hill	possible side hill	yes	yes	yes
Slope/Topo	steep	moderate-steep	moderate-steep	moderate-steep	steep	steep	steep
Creekfront	none	none	none	none	yes-Eureka	yes-Eureka	yes-Eureka
Groundcover	grasses, shrubs	grasses, rock	grasses/ shrubs	grasses/ shrubs	grasses,rock, small trees	grasses,rock, small trees	grasses,rock, small trees
View	to north, Friday Cr	McKinley/ Eldorado/ Eureka	McKinley/ Eldorado/ Eureka	McKinley/ Eldorado/ Eureka	limited	limited	limited
Building Sites	one	two	two-three	two-three	limited	limited	limited
Exposure	to north	to south & west	to south	to south	to north & west	to north	to north
Evidence of Mining	tailings & adit	none	small cabin	none	placer tailings	placer tailings	placer tailings
Overall Ranking	3	4	3-4	3-4	3	4	4

1 = Poor
2 = Fair
3 = Avg.
4 = Good
5 = Best

TABLE 9.- PHYSICAL FEATURES: KANTISHNA PATENTED LODE CLAIMS.-
(Continued)

Claim Number	22	23	24	25	26	27	28
Claim Name	Keystone #2	Pennsylvania #2	Gold King	East Gold King	Blue Bell	Pittsburg	Doherty
Road Access	not possible	buildable	none - v. difficult	crosses prop.	road bisects	crosses prop.	road bisects
Slope/Topo	moderate-steep	moderate	steep	mild	steep	mild to moderate	moderate to steep
Creekfront	drainage	none	small drainage	none	small drainage	none	none
Groundcover	grasses, shrubs	grasses, shrubs, small trees	grasses, rock	grasses, shrubs	shrubs, rock	shrubs, grass small trees	grasses/ tundra
View	Eureka, Eldorado	McKinley/ Eldorado	Eureka/ltd McKinley	McKinley/ Eldorado	McKinley, Eureka	McKinley/ Eldorado	McKinley/ Eldorado
Building Sites	two	3-4	none	three	two max.	three	two
Exposure	to south	to south	to east	to south & west	to south	to south	to south
Evidence of Mining	none	tailings	none	tailings	none	none	none
Overall Ranking	3	4	1-2	5	3	5	4

1 = Poor
2 = Fair
3 = Avg.
4 = Good
5 = Best

TABLE 9.- PHYSICAL FEATURES: KANTISHNA PATENTED LODE CLAIMS.-
(Continued)

Claim Number	29	30	31	32	33	34
Claim Name	Merry Widow	Silver King	Jupiter-Mars	Chloride	Waterloo	Chlorine
Road Access	easily built	yes	none	none	none	none
Slope/Topo	moderate w/ bank	mild w/bank	moderate-steep	steep	steep	steep
Creekfront	yes	yes-Eureka	none	none	none	none
Groundcover	grass/shrubs	grass/shrubs	minimal/rock	rock	rock only	rock only
View	area & down-stream	area & down-stream	very good	very good	very good	very good
Building Sites	many	many	1 max	none	none	none
Exposure	to south	to south	to south	to south	to south	to south
Evidence of Mining	overlapping placer	overlapping placer	tailings/adit	tailings	none	none
Overall Ranking	5	5	2	1	1	1

1 = Poor
2 = Fair
3 = Avg.
4 = Good
5 = Best

TABLE 10.- ESTIMATED SURFACE ESTATE VALUES
KANTISHNA PATENTED CLAIMS
SUMMARY OF INFORMATION DERIVED
DOWL/PLANGRAPHICS

NPS Claim Number	Claim Name	Value Per Acre ($)	Total Value ($)
1.	Whistler	400	8,000
2.	Bright Light	400	8,000
3.	Lucky Strike	1,200	24,000
4.	Galena	1,000	20,000
5.	Red Top	1,500	30,000
6.	Star	1,100	22,000
7.	Friday	1,100	22,000
8.	Martha Q.	900	18,000
9.	Pollywonder	900	18,000
10.	Gold Dollar	1,000	20,000
11.	Golden Eagle	1,200	24,000
12.	Francis	1,500	30,000
13.	Little Maud	1,500	30,000
14.	Little Annie	1,500	30,000
15.	Little Annie #2	900	18,000
16.	Silver Pick #2	1,300	26,000
17.	Silver Pick	1,200	24,000
18.	Darling	1,200	24,000
19.	White Hawk	1,200	24,000
20.	Water Level	1,300	26,000
21.	Sulfide	1,300	26,000
22.	Keystone	800	16,000
23.	Pennsylvania	1,400	28,000
24.	Gold King	600	12,000
25.	East Gold King	1,500	30,000
26.	Blue Bell	900	18,000
27.	Pittsburgh	1,500	30,000
28.	Doherty	1,300	26,000
29.	Merry Widow	1,500	30,000
30.	Silver King	1,500	30,000
31.	Jupiter-Mars	600	12,000
32.	Chloride	400	8,000
33.	Waterloo	400	8,000
34.	Chlorine	400	8,000
TOTAL KANTISHNA HILLS STUDY AREA: PATENTED LODE			$728,000

each patented mining claim. Of all the properties, Claim #25 comes closest to being the "key parcel" for extrapolating other values.

Several of the claims may bring higher sales prices for commercial development and significantly higher per acre prices for these claims. It would be unreasonable to apply this valuation to any particular patented claim; the impact on the total purchase price of all patented claims would be modest.

ESTIMATED MARKET VALUE

This section presents the methodology for estimating the market value of the claims within the study areas and the results of that procedure. The market value for patented claims includes the values for the surface estate developed in the previous section.

The valuations are presented as: totals for each study area, by placer and lode; totals for claim group, by placer and lode; totals for stream segment for placer; and totals by claim for placer and lode. Each set of values involves its own set of assumptions and caveats.

The values given by claim are presented reluctantly. The deficiencies of the information base available for developing lode claim valuations were discussed in Placer and Lode In Situ Resource, Estimates.

PLACER VALUATIONS

Valuation of market value of placer claims was accomplished by estimating the cost of extracting the minerals and determining the present worth of the annual income from the properties. These computations were made for each stream segment. Values for individual claims were derived by disaggregating the stream segment valuations using a subjective ranking of each claim within the segment and aggregating the individual claim values to the appropriate claim groups.

Net Resource Value

Tables 11 and 12 summarize the computations leading to the calculation of net resource value. Net resource value is defined as the value of the resource in situ less the cost of extraction. Table 11 uses the inferred resources value from table 7. Three operation sizes are assumed to occur within the Kantishna Hills study area, one processing 4,000 cy/day, one processing 1,000 cy/day, and one processing 200 cy/day, respectively. Each stream segment was matched with a size of operation which considered the volume of inferred resources, size of current operations, ownership patterns, and physical constraints to mining.

A hypothetical mine life was calculated (column 2) given the size of operation and an assumed operating period of 100 days/year. The mine life was converted into a number of operations each with an associated operating life (column 3). It was assumed that an individual operation would be limited to 15 years considering an operator's assumed desire to expediently extract the wealth and other factors including equipment life. In those cases where mine life exceeded 15 years, additional operation units were added to mine out the stream segment in the 15-year period. This assumption reflects the current practice of owner/operators leasing ground in excess of what they are mining themselves and of owners using multiple contract miners on their properties. This assumption has the effect of increasing the present worth of the properties (that is, estimated market value) by increasing the annual income and by decreasing the time period which increases the present worth multiplier.

TABLE 11.- PLACER CLAIMS: ESTIMATED MINING COST
DOWL/PLANGRAPHICS

Stream Segment[2]	Estimated Resources (MBCY)	Size of[1] Operation (cy/day)	Hypothetical Mine Life (yrs)	Est.[2] No. of Operation (#/years)	Operating[3] Cost ($)
	(1)	(2)	(3)	(4)	(5)
KANTISHNA HILLS STUDY AREA					
Eureka Ck, upper, SC[4]	156.4	1,000	2	1/2	508,000
B	46.9				
mid, SC[4]	176.0	1,000	3	1/3	636,000
Sl	78.2				
mouth, SC[4]	284.4	1,000	4	1/4	782,000
Sl	28.4				
Friday Cr, upper, SC[4]	14.2	1,000	3	1/3	747,000
B	284.4				
mid, SC[4]	19.9	1,000	26	1/15	3,750,000
B	2508.0			1/11	1,570,000
mouth, SC[4]	117.3	1,000	11	1/11	2,542,000
B	899.6				
Slate Cr, all	14.7	1,000	1	1/1	37,000
Eldorado Cr, SC[4]	211.2	4,000	1	1/1	821,000
Sl	117.3				
Spruce Cr, upper, all	97.8	1,000	1	1/1	244,000
lower, all	1936.0	1,000	20	1/15	3,750,000
				1/5	1,090,000
mouth, all	1064.8	1,000	11	1/11	2,662,000

See footnotes at end of table 11.

TABLE 11.- PLACER CLAIMS: ESTIMATED MINING COST
DOWL/PLANGRAPHICS. - (Continued)

Stream Segment[2]	Estimated Resources (MBCY)	Size of[1] Operation (cy/day)	Hypothetical Mine Life (yrs)	Est.[2] No. of Operation (#/years)	Operating[3] Cost ($)
	(1)	(2)	(3)	(4)	(5)
KANTISHNA HILLS STUDY AREA.- (Cont.)					
Rainy Cr, upper, all	246.7	1,000	3	1/3	617,000
lower, SC[4,5]	2,829.6			1/15	3,750,000
B	3,097.6	1,000	53	1/15	3,750,000
				1/15	3,750,000
				1/8	1,818,000
Glen Cr, E. Fork, SC[4]	97.8				
B	1,368.9	4,000	4	1/4	3,667,000
W. Fork, SC[4]	97.8				
B	1,368.9	4,000	4	1/4	3,667,000
Frk Jct, All	733.9	4,000	2	1/2	1,833,000
lower, SC[4]	264.0				
S1	660.0	4,000	2	1/2	2,310,000
Willow Cr, upper, all	48.9	1,000	1	1/1	122,000
lower, all[5]	1,936.0	1,000	20	1/15	3,750,000
Moose Cr,					
Spruce to Glen, SC[4]	1,173.3	4,000	6	1/15	1,090,000
B	1,097.3			1/6	8,177,000
Glen to Rainy, SC[4]	3,813.3	4,000	18	1/15	15,000,000
B	3,355.7			1/3	2,923,000
Below Rainy, SC[4]	2,466.7				
B	513.3	4,000	8	1/8	7,450,000

See footnotes at end of table 11.

TABLE 11.- PLACER CLAIMS: ESTIMATED MINING COST
DOML/PLANGRAPHICS.- (Continued)

Stream Segment[2]	Estimated Resources (MBCY)	Size of[1] Operation (cy/day)	Hypothetical Mine Life (yrs)	Est.[2] No. of Operation (#/years)	Operating[3] Cost ($)
	(1)	(2)	(3)	(4)	(5)
KANTISHNA HILLS STUDY AREA.- Cont.					
Moose Cr,					
Eureka to Friday, all	2,400.0	4,000	7	1/7	6,050,000
				1/15	3,750,000
Jauhola Group SC[4],[5]	7.8	1,000	66	1/15	3,750,000
B	6,502.2			1/15	3,750,000
				1/15	3,750,000
				1/6	1,275,000
Yellow Cr, undiv, SC[4]	78.2	1,000	14	1/14	3,481,000
B	1,314.1				
Glacier Cr, upper SC[4],[5]	195.6	1,000	18	1/15	3,750,000
B	1,525.3			1/3	552,000
lower, SC[4]	365.9	4,000	10	1/10	9,586,000
B	3,468.7				
Caribou Cr, upper SC[4],[5]	715.0	4,000	39	1/15	15,000,000
B	14,586.0			1/15	15,000,000
				1/9	8,253,000
mid SC[4]	645.3	4,000	14	1/14	13,713,000
B	4,840.0				
lower SC[4],[5]	782.2	4,000	25	1/15	15,000,000
B	8,964.3			1/10	9,366,000

See footnotes at end of table 11.

TABLE 11.- PLACER CLAIMS: ESTIMATED MINING COST
DOWL/PLANGRAPHICS

Stream Segment[2]	Estimated Resources (MBCY)	Size of[1] Operation (cy/day)	Hypothetical Mine Life (yrs)	Est.[2] No. of Operation (#/years)	Operating[3] Cost ($)
	(1)	(2)	(3)	(4)	(5)
DUNKLE MINE STUDY AREA					
Colorado Cr, upper SC[4]	19.6	200	5	1/5	245,000
B	78.2				
lower SC[4]	146.7	200	10	1/10	489,000
B	48.9				
mouth all[5]	387.2	200	20	1/15	750,000
				1/5	218,000

1. assume 100 day/year operation
2. assumes maximum 15 years operation
3. assume $2.50/cy
4. stream channel, bench, and slope worked jointly
5. assumes 15 year operator works at maximum for life of operation, ie. $3,750,000 or $15,000,000 operating cost in 15 years. Remaining operated costs goes to other operator.

Note -

Totals affected by rounding.
SC = Stream Channel
Sl - Slope
B = Bench

TABLE 12.- PLACER CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS

Stream Segment	Resource Value In Situ ($)	Operating Cost ($)	Net Resource Value 100% Rec. ($)
	(1)	(2)	(3)
KANTISHNA HILLS STUDY AREA			
Eureka Ck, upper, SC B	563,000	508,000	56,000
mid, SC Sl	1,284,000	636,000	648,000
mouth, SC Sl	1,302,000	782,000	520,000
Friday Cr, upper, SC B	5,378,000	747,000	4,631,000
mid, SC B	19,409,000	6,320,000	13,089,000
mouth, SC B	7,231,000	2,542,000	4,689,000
Slate Cr, all	154,000	37,000	118,000
Eldorado Cr, SC Sl	2,428,000	821,000	1,607,000
Spruce Cr, upper, all	390,000	244,000	146,000
lower, all	5,542,000	4,840,000	702,000
mouth, all	1,109,000	2,662,000	111,000[2]

See footnotes at end of table 12.

TABLE 12.- PLACER CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment	Resource Value In Situ ($)	Operating Cost ($)	Net Resource Value 100% Rec. ($)
	(1)	(2)	(3)
KANTISHNA HILLS STUDY AREA.- (Cont.)			
Rainy Cr, upper, all	1,030,000	617,000	413,000
lower, SC	16,628,000	13,068,000	3,560,000
B			
Glen Cr, E. Fork, SC	6,274,000	3,667,000	2,607,000
B			
W. Fork, SC	6,439,000	3,667,000	2,772,000
B			
Frk Jct, All	6,951,000	1,833,000	5,118,000
lower, SC	5,020,000	2,310,000	2,710,000
Sl			
Willow Cr, upper, all	21,000	122,000	-0- [3]
lower, all	808,000	4,840,000	80,000 [2]
Moose Cr, Spruce to Glen SC	3,407,000	8,177,000	340,000 [2]
B			
Glen to Rainy, SC	10,554,000	17,923,000	1,055,000 [2]
B			
Below Rainy, SC	8,866,000	7,450,000	1,416,000
B			

See footnotes at end of table 12.

TABLE 12.- PLACER CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment		Resource Value In Situ ($)	Operating Cost ($)	Net Resource Value 100% Rec. ($)
		(1)	(2)	(3)
KANTISHNA HILLS STUDY AREA.- (Cont.)				
Moose Cr, Eureka to Friday, all		8,573,000	6,050,000	2,523,000
Jauhola Group	SC	40,175,000	16,275,000	23,900,000
	B			
Yellow Cr,	SC	4,586,000	3,481,000	1,105,000
	B			
Glacier Cr, upper	SC	14,240,000	4,302,000	9,938,000
	B			
lower,	SC	31,769,000	9,586,000	22,183,000
	B			
Caribou Cr, upper	SC	119,459,000	38,253,000	81,206,000
	B			
mid	SC	12,305,000	13,713,000	1,230,000[2]
	B			
lower	SC	74,171,000	24,366,000	49,805,000
	B			
TOTAL KANTISHNA HILLS STUDY AREA: PLACER				$238,278,000

See footnotes at end of table 12.

TABLE 12.- PLACER CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment	Resource Value In Situ ($)	Operating Cost ($)	Net Resource Value 100% Rec. ($)
	(1)	(2)	(3)
DUNKLE MINE STUDY AREA			
Colorado Cr, upper SC	196,000	245,000	20,000[2]
B			
lower SC	350,000	489,000	35,000[2]
B			
mouth all	1,146,000	968,000	178,000
B			
TOTAL DUNKLE MINE AREA			$233,000
TOTAL STUDY AREA			$238,511,000

1. Assume 85% recovery of gold.
2 Adjusted to reflect 10% of resource value in situ.
3. Negligible value.

Note -

Totals affected by rounding.
SC = Stream Channel
Sl = Slope
B = Bench

Operating costs are assumed to be $2.50/cy and reflect estimates provided by miners in the study area and cost data widely used within Alaska for estimation purposes. The costs are calculated using the inferred resources from column 1.

Table 12 summarizes the calculation of net resource value. Estimated operating costs were subtracted from the in situ resource value derived in table 7. In those instances where such a calculation resulted in a negative net value, the value was adjusted. The adjustment equalied 10% of the resource value in situ. The claim has a present value to the current owner despite current economics. The owner may reasonably argue in establishing an asking price for the claim that the price of gold will increase, cost of operation will decrease, that the deposit may be richer than presented, or some combination of these factors. The 10% figure was not altogether arbitrary. Currently claim owners lease claims to miners for a minimum 10% royalty or rent. This minimum rate was selected for establishing the adjusted value.

The total net value for Kantishna Hills study area placer claims is $238,278,000. The Dunkle Hills study area placers have a net value in situ of $233,000. The placer claims of the two study areas in total have a value of $238,511,000. These figures are converted to estimated market value and disaggregated to individual claims and ownership units in the following subsection.

Market Value Estimates

Table 13 presents the results of the present worth values and intermediate calculations leading to an estimate of the market value of the placer claims in the study areas.

The net extractable value (column 1) is derived from the resource value in situ and operating costs presented in table 12 considering an 85% recovery factor for the gold. When the operating cost exceeded the resource value, the market value was set at 10% of the resource value in situ using the same assumption discussed previously. An annual recovery was calculated for each operation defined in table 11 and the number of operations and their respective lives are repeated (column 3). The present worth of the annual recovery for each operation was calculated using an interest rate of 25%. The present worth calculation reflects the current worth of money that would be earned by the operation during its life. The interest rate reflects the high level of return and associated risks that are typical to mining ventures.

The estimated market value for Kantishna Hills study area placer claims is $63,163,000. The Dunkle Mine study area placers have an estimated market value of $66,000. The placer claims in the two study areas have a total estimated market value of $63,229,000.

Table 14 provides a set of market values calculated for each stream segment and subjectively apportioned to each claim. The placer claims with National Park Service claim number are identified in column 1, the apportionment factors for each claim within a particular stream segment are listed in

TABLE 13.- PLACER CLAIMS: ESTIMATED MARKET VALUE DOWL/PLANGRAPHICS

Stream Segment	Net Extractable Value (85% Rec.) ($)	Annual[1] Recovery by Operation ($)	Estimated No. of Operations and Life (#/yrs)	Estimated Market Value ($)
	(1)	(2)	(3)	(4)
KANTISHNA HILLS STUDY AREA				
Eureka Ck, upper, SC	(-29,496)			56,000[3]
B				
mid, SC	455,400	151,800	1/3	296,000
Sl				
mouth, SC	324,700	81,175	1/4	192,000
Sl				
Friday Cr, upper, SC	3,824,300	1,274,767	1/3	2,488,000
B				
mid, SC	10,177,650	391,448	1/15	1,511,000
B			1/11	1,431,000
mouth, SC	3,603,796	327,617	1/11	1,198,000
B				
Slate Cr, all	94,393	94,393	1/1	76,000
Eldorado Cr, SC	1,242,800	1,242,800	1/1	994,000
Sl				
Spruce Cr, upper, all	3,067,671	3,067,671	1/1	2,454,000
lower, all	(-128,641)			554,000[3]
mouth, all	(-1,719,000)			111,000[3]

See footnotes at end of table 13.

TABLE 13.- PLACER CLAIMS: ESTIMATED MARKET VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment	Net Extractable Value (85% Rec.) ($)	Annual[1] Recovery by Operation ($)	Estimated No. of Operations and Life (#/yrs)	Estimated Market Value ($)
	(1)	(2)	(3)	(4)
KANTISHNA HILLS STUDY AREA.- (Cont.)				
Rainy Cr, upper, all	258,292	86,097	1/3	168,000
lower, SC	1,066,076	20,114	1/15	78,000
B			1/15	78,000
			1/15	78,000
			1/8	67,000
Glen Cr, E. Fork, SC	1,666,370	416,592	1/4	984,000
B				
W. Fork, SC	1,806,295	451,573	1/4	1,067,000
B				
Frk Jct, All	1,525,357	762,678	1/2	1,098,000
lower, SC	1,956,791	978,395	1/2	1,409,000
Sl				
Willow Cr, upper, all	(-104,513)			2,000[3]
lower, all	(-4,152,779)			81,000[3]
Moose Cr, Spruce to Glen SC	(-5,280,759)			341,000[3]
B				
Glen to Rainy, SC	(-9,951,585)			1,055,000[3]
B				
Below Rainy, SC	86,403	10,800	1/8	36,000
B				

See footnotes at end of table 13.

TABLE 13.- PLACER CLAIMS: ESTIMATED MARKET VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment		Net Extractable Value (85% Rec.) ($)	Annual[1] Recovery by Operation ($)	Estimated No. of Operations and Life (#/yrs)	Estimated Market Value ($)
		(1)	(2)	(3)	(4)
KANTISHNA HILLS STUDY AREA.- (Cont.)					
Moose Cr, Eureka to Friday, all		1,236,666	176,666	1/7	558,000
Jauhola Group	SC	17,873,495	270,810	1/15	1,045,000
	B			1/15	1,045,000
				1/15	1,045,000
				1/15	1,045,000
				1/6	799,000
Yellow Cr,	SC	417,517	29,822	1/14	114,000
	B				
Glacier Cr, upper	SC	7,802,071	433,448	1/15	1,673,000
	B			1/3	846,000
lower,	SC	17,417,625	1,741,762	1/10	6,220,000
	B				
Caribou Cr, upper	SC	63,287,150	1,622,747	1/15	6,262,000
	B			1/15	6,262,000
				1/9	5,620,000
mid	SC	(-3,254,463)			1,230,000[3]
	B				
lower	SC	38,679,194	1,547,167	1/15	5,971,000
	B			1/10	5,525,000
TOTAL KANTISHNA HILLS STUDY AREA: PLACER					$63,163,000

See footnotes at end of table 13.

TABLE 13.- PLACER CLAIMS: ESTIMATED MARKET VALUE
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment	Net Extractable Value (85% Rec.) ($)	Annual[1] Recovery by Operation ($)	Estimated No. of Operations and Life (#/yrs)	Estimated Market Value ($)
	(1)	(2)	(3)	(4)
DUNKLE MINE STUDY AREA				
Colorado Cr, upper SC				
B	(- 78,000)			20,000[3]
lower SC	(-191,441)			35,000[3]
mouth all	6,154	308[4]		11,000
TOTAL DUNKLE MINE STUDY AREA: PLACER				66,000
TOTAL STUDY AREA				63,229,000

1. assume 85% recovery and life of operation from column C, table 9
2. present worth at 25% interest
3. 10% of resource in-situ, table 10, column 1
4. Annual recovery rate insignificant, used 10% of resource value in situ

Notes -

Totals affected by rounding
SC = Stream Channel
Sl = Slope
B = Bench

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS
DOWL/PLANGRAPHICS

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
Eureka Creek, upper (56,000)	EC3	5	2,800
	EC4	5	2,800
	EC5	5	2,800
	EC6	5	2,800
	EC7	10	5,600
	UD8	35	19,600
	UD9	25	14,000
	UD10	10	5,600
Eureka Creek, middle (296,000)	EC2	75	222,000
	EC1	25	74,000
Eureka Creek, mouth (192,000)	D1	50	96,000
	D2	30	57,600
	D3	20	38,400
Friday Creek, upper (2,488,000)	A3	70	1,741,600
	A4	30	746,400
Friday Creek, middle (2,942,000)	A1	50	1,471,000
	A2	50	1,471,000
Friday Creek, mouth (1,198,000)	DI	100	1,198,000
Slate Creek (76,000)	AT1	40	30,400
	AT2	60	45,600
Eldorado Creek (994,000)	L13	5	49,700
	L14	5	49,700
	L15	15	149,100
	L16	20	198,800
	L17	25	248,500
	L18	15	149,100
	L19	10	99,400
	L20	5	49,700
Spruce Creek, upper (2,454,000)	S7	25	613,500
	S8	75	1,840,500

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS DOWL/PLANGRAPHICS.- (Continued)

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
Spruce Creek, lower (554,000)	S2	10	55,400
	S3	15	83,100
	S4	20	110,800
	S5	30	166,200
	S6	25	138,500
Spruce Creek, mouth (111,000)	S1	100	111,000
Rainy Creek, upper (168,000)	R4	25	42,000
	R5	20	33,600
	R6	40	67,200
	R7	10	16,800
	R8	5	8,400
Rainy Creek, lower (301,000)	R1	45	135,450
	R2	30	9,300
	R3	25	75,250
Glen creek, E. Fork (part) (984,000)	Part GK11	35	344,400
	GK12	15	147,600
	GK13	20	196,800
	GK14	25	246,000
	GK15	5	49,200
Glen Creek, W. Fork (1,067,000)	Part GK7	30	320,100
	GK8	45	480,150
	GK9	15	160,050
	GK10	10	106,700
Glen Creek, Fork Jct. (1,098,000)	Part GK7	15	164,700
	Part GK11	65	713,700
	Part GK6	20	219,600
Glen Creek, lower (1,409,000)	GK1	15	211,350
	GK2	10	140,900
	GK3	15	211,350
	GK4	15	211,350
	GK5	20	281,800
	Part GK6	25	352,250

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS DOWL/PLANGRAPHICS.- (Continued)

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
Willow Creek, upper (2,000)	W4	15	300
	W5	20	400
	W6	35	700
	W7	20	400
	W8	10	200
Willow Creek, lower (81,000)	W3	10	8,100
	W2	20	16,200
	W1	35	28,350
	L56	20	16,200
	L53	15	12,150
Moose Creek, Spruce to Glen (341,000)	L52	30	102,300
	L51	25	85,250
	L50	15	51,150
	L49	10	34,100
	L48	20	68,200
Moose Creek, Glen to Rainy (1,055,000)	L47	15	158,250
	L46	5	52,750
	L45	5	52,750
	L44	5	52,750
	L43	15	158,250
	L42	5	52,750
	L41	5	52,750
	L40	5	52,750
	L39	10	105,500
	L38	5	52,750
	L37	10	105,500
	L36	5	52,750
	L35	10	105,500
Moose Creek, below Rainy (36,000)	L22	25	9,000
	L23	5	1,800
	L24	5	1,800
	L25	25	9,000
	L26	5	1,800
	L27	20	7,200
	L28	15	5,400

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS DOWL/PLANGRAPHICS.- (Continued)

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
Moose Creek, Eureka to Friday (558,000)	MC1	10	55,800
	B	40	223,200
	MC2	20	111,600
	T3	15	83,700
	T4	15	83,700
Moose Creek, Jauhola (4,979,000)	J1	80	3,983,200
	J2	15	746,850
	J3	5	248,950
Yellow Creek (114,000)	YP1	50	57,000
	YP2	5	5,700
	YP3	5	5,700
	YP4	40	45,600
Glacier Creek, upper (2,519,000)	RH1	20	503,800
	RH2	15	377,850
	RH3	2	50,380
	SK1	5	125,950
	SK2	20	503,800
	SK3	2	50,380
	LA1	1	25,190
	LA2	5	125,950
	LA3	15	377,850
	LA4	15	377,850
Glacier Creek, lower (6,220,000)	GA1	30	1,866,000
	GA2	35	2,177,000
	GA3	15	933,000
	GAB3	5	311,000
	GA4	10	622,000
	GA5	5	311,000

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS DOWL/PLANGRAPHICS.- (Continued)

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
Caribou Creek, upper (18,144,000)	HCA24	5	907,200
	HCA23	10	1,814,400
	HCA22	5	907,200
	HCA21	15	2,721,600
	HCA20	15	2,721,600
	HCA19	3	544,320
	HCA18	2	362,880
	HCA17	20	3,628,800
	HCA16	10	1,814,400
	HCA15	15	2,721,600
Caribou Creek, middle (1,230,000)	HCA14	10	123,000
	HCA13	15	184,500
	HCA12	10	123,000
	HCA11	10	123,000
	HCA10	10	123,000
	HCA9	15	184,500
	HCA8	15	184,500
	HCA7	15	184,500
Caribou Creek, lower (11,496,000)	HCA6	15	1,724,400
	HCA5	15	1,724,400
	HCA4	10	1,149,600
	HCA3	5	574,800
	HCA2	5	574,800
	HCA1	5	574,800
	HA1A	5	574,800
	HA2A	3	344,880
	HBA6	4	459,840
	HBA5	5	574,800
	HBA4	10	1,149,600
	HBA3	8	919,680
	HBA2	5	574,800
	HBA1	5	574,800

TABLE 14.- ESTIMATED MARKET VALUE OF INDIVIDUAL PLACER CLAIMS
DOWL/PLANGRAPHICS.- (Continued)

Stream Segment (total value)	NPS Claim Number	Apportionment Factor (%)	Estimated Market Value ($)
DUNKLE			
Colorado, upper	9	25	5,000
	8	30	6,000
	7	35	7,000
	6	35	2,000
Colorado, lower	5	15	5,250
	4	15	5,250
	3	10	3,500
	2	60	21,000
Colorado, mouth	1	100	115,000
TOTAL			56,671,000

column 2, and the estimated market value of each claim is presented in column 3.

The estimated market value of the claims by claim group were calculated by aggregating the values of table 14 and are presented in table 15.

LODE VALUATIONS

The estimated market value of patented and unpatented lode claims was calculated by estimating the cost and time requirements for extracting the resources on each claim and by determining the present worth of an estimated annual income.

Net Resource Value

Operating costs were estimated at $150/ton, an expected cost if ores were processed in a 250 ton/day mill. For those miners with anticipated smaller production levels the same rate is used. It is assumed that milling costs would be higher but that lower levels of mechanization and overhead would offset the higher cost.

Time requirements were established by assuming a production level which reflected the size of the estimated deposit. Two mining rates (signs of operation) were used: 10 ton/day and 100 ton/day. A 330 day work year was assumed. Table 16 summarizes the resource base, size of mining operation, approximate life of mine, and the cost of extraction.

TABLE 15.- ESTIMATED MARKET VALUE
OF PLACER CLAIM GROUPS
DOWL/PLANGRAPHICS

NPS Claim Reference	Estimated Market Value $
EC	312,800
D	192,000
UD	39,200
A	5,430,000
DI	1,198,000
B	223,200
AT	76,000
S	3,119,000
L	2,454,000
R	469,000
GK	4,558,000
T	167,400
W	54,650
J	4,979,000
SK	680,130
RH	932,030
YP	114,000
MC	167,400
LA	906,840
GA	5,909,000
GA [B3]	311,000
HCA	25,696,800
HA	919,680
HBA	4,253,520
Dunkle	66,000
TOTAL	63,228,650

TABLE 16.- LODE CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS

Claim Number	Claim Name	Estimated[1] Resources (T)	Size of Operation (T/day)	Mine[2] Life (yrs)	Mining[3] Cost ($)
KANTISHNA HILLS STUDY AREA: PATENTED LODE					
1.	Whistler	650	10	l.t. 1	98,000
2.	Bright Light	70	10	l.t. 1	10,500
3.	Lucky Strike	3,900	10	2	685,000
4.	Galena	7,900	10	3	1,185,000
5.	Red Top	20,400	10	7	3,060,000
6.	Star	g-1	--	-	--
7.	Friday	g-1	--	-	--
8.	Martha Q.	7,500	10	3	1,125,000
9.	Pollywonder	g-1	--	-	--
10.	Gold Dollar	22,000	10	7	3,300,000
11.	Golden Eagle	5,300	10	2	795,000
12.	Francis	470	10	l.t. 1	71,000
13.	Little Maud	20,000	10	6	3,000,000
14.	Little Annie	90,000	100	3	13,500,000
15.	Little Annie #2	g-2	--	-	--
16.	Silver Pick #2	g-3	--	-	--
17.	Silver Pick	169,400	100	6	25,410,000
18.	Darling	g-3	--	-	--
19.	White Hawk	23,800	10	8	3,570,000
20.	Water Level	3,800	10	2	570,000
21.	Sulfide	1,900	10	l.t. 1	285,000
22.	Keystone	26,600	10	8	3,990,000
23.	Pennsylvania	31,200	10	10	4,680,000
24.	Gold King	1,700	10	l.t. 1	255,000
25.	East Gold King	600	10	l.t. 1	90,000
26.	Blue Bell	600	10	l.t. 1	90,000
27.	Pittsburgh	2,100	10	l.t. 1	315,000
28.	Doherty	2,100	10	l.t. 1	315,000
29.	Merry Widow	3,200	10	l.t. 1	480,000
30.	Silver King	5,600	10	2	840,000
31.	Jupiter-Mars	20,800	10	7	3,120,000
32.	Chloride	653,300	100	20	97,995,000
33.	Waterloo	800	10	l.t. 1	120,000
34.	Chlorine	800	10	l.t. 1	75,000

See footnotes at end of table 16.

TABLE 16.- LODE CLAIMS: NET RESOURCE VALUE
DOWL/PLANGRAPHICS.- (Continued)

Claim Number	Claim Name	Estimated[1] Resources (T)	Size of Operation (T/day)	Mine[2] Life (yrs)	Mining[3] Cost ($)
KANTISHNA HILLS STUDY AREA: UNPATENTED LODE					
A	RED 1	29,800	10	9	4,470,000
B	BANJO	45,000	10	14	6,750,000
C	HARDROCK	111,500	100	4	16,725,000
D	PASS	5,000	10	2	840,000
E	TUGBOAT ANNIE	14,000	10	5	2,100,000

1. reference table 8
2. assume 330 operating days
3. $150/T

Notes -

l.t. = less than 1 year
g = grouped with adjacent claim; g-1 with Martha Q, g-2 with Little Annie, g-3 with Silver Pick

Value Estimates

Table 17 summarizes the estimated market value of each lode claim. The present worth was calculated using the estimated mine life, the annual income, and the appropriate present worth factor. Annual income was determined by subtracting the estimated cost of extraction (table 16) from the in situ resource value (table 8) divided by the mine life. The value of the patented claim was increased by the value of the surface estate (table 10).

It should be noted that the valuation of the individual claims are more sensitive to the required approximations and assumptions than the value of all claims as a unit. Total estimated market value including the surface estate is $93,979,000.

Table 18 presents the estimated market value by ownership and table 19 differentiates the market value by patented and non-patented claims.

TABLE 17.- LODE CLAIMS: ESTIMATED MARKET VALUE
DOWL/PLANGRAPHICS

Claim Number	Claim Name	Net[1] Resource Value in situ ($)	Annual Income ($)	Present[2] Worth ($)	Surface[3] Estate Value ($)	Estimated Market Value ($)
		(1)	(2)	(3)	(4)	(5)
KANTISHNA HILLS STUDY AREA: PATENTED LODE						
1.	Whistler	10,000*	10,000	10,000	8,000	18,000
2.	Bright Light	1,000*	1,000	1,000	8,000	9,000
3.	Lucky Strike	45,000*	45,000	45,000	24,000	69,000
4.	Galena	3,557,000	1,186,000	2,283,000	20,000	2,303,000
5.	Red Top	29,123,000	4,160,000	13,149,000	30,000	13,179,000
6.	Star	g-1	--	--	22,000	g-1
7.	Friday	g-1	--	--	22,000	g-1
8.	Martha Q.	5,035,000	1,678,000	3,275,000	18,000	3,355,000
9.	Pollywonder	g-1	--	--	18,000	g-1
10.	Gold Dollar	1,765,000	252,000	797,000	20,000	817,000
11.	Golden Eagle	4,760,000	2,380,000	3,427,000	24,000	3,451,000
12.	Francis	96,000	96,000	96,000	30,000	126,000
13.	Little Maud	279,000*	279,000	279,000	30,000	309,000
14.	Little Annie	1,143,000*	1,143,000	1,143,000	30,000	1,191,000
15.	Little Annie #2	g-2	--	--	18,000	g-2
16.	Silver Pick #2	g-3	--	--	26,000	g-3
17.	Silver Pick	89,918,000	14,986,000	44,225,000	24,000	44,249,000
18.	Darling	g-3	--	--	24,000	g-3
19.	White Hawk	3,372,000	421,000	1,402,000	24,000	1,426,000
20.	Water Level	672,000	336,000	484,000	26,000	508,000
21.	Sulfide	7,000*	7,000	7,000	26,000	33,000
22.	Keystone	2,860,000	358,000	1,192,000	16,000	1,206,000
23.	Pennsylvania	281,000*	281,000	281,000	28,000	309,000
24.	Gold King	6,000*	6,000	6,000	12,000	18,000
25.	East Gold King	2,000*	2,000	2,000	30,000	32,000
26.	Blue Bell	2,000*	2,000	2,000	18,000	20,000
27.	Pittsburgh	6,000*	6,000	6,000	30,000	36,000
28.	Doherty	6,000*	6,000	6,000	26,000	42,000
29.	Merry Widow	2,649,000	2,649,000	2,649,000	30,000	2,649,000
30.	Silver King	3,401,000	1,705,000	2,455,000	30,000	2,485,000
31.	Jupiter-Mars	320,000*	320,000	320,000	12,000	332,000
32.	Chloride	8,224,000*	8,224,000	8,224,000	8,000	8,232,000
33.	Waterloo	6,000*	6,000	6,000	8,000	14,000
34.	Chlorine	1,000*	1,000	1,000	8,000	9,000
TOTAL KANTISHNA HILLS STUDY AREA: PATENTED LODE				85,774,000	728,000	86,502,000

See footnotes at end of table 17.

TABLE 17.- LODE CLAIMS: ESTIMATED MARKET VALUE
DOWL/PLANGRAPHICS.- (Continued)

Claim Number	Claim Name	Net[1] Resource Value in situ ($)	Annual Income ($)	Present[2] Worth ($)	Surface[3] Estate Value ($)	Estimated Market Value ($)
		(1)	(2)	(3)	(4)	(5)
KANTISHNA HILLS STUDY AREA: UNPATENTED						
A	RED 1	12,837,000	1,426,000	4,938,000	-0-	4,938,000
B	BANJO	2,387,000	170,000	650,000	-0-	650,000
C	HARDROCK	1,720,000*	1,720,000	1,720,000	-0-	1,720,000
D	PASS	57,000*	57,000	57,000	-0-	57,000
E	TUGBOAT ANNIE	112,000*	112,000	112,000	-0-	112,000
TOTAL KANTISHNA HILLS STUDY AREA: UNPATENTED LODE				7,477,000	-0-	7,477,000
TOTAL LODE CLAIMS				93,251,000	728,000	93,979,000

1. from table 8
2. interest rate at 25%
3. from table 10

*Negative or negligible net resource value; value based on 10% of resource value in situ.

Notes -

g - grouped with adjacent claim; g-1 with Martha, g-2 with Little Annie, g-3 with Silver Pick.

TABLE 18.- KANTISHNA LODE CLAIMS: ESTIMATED MARKET VALUE
BY OWNERSHIP
DOWL/PLANGRAPHICS

	Mineral Value ($)	Surface Estate ($)	Market Value ($)
KANTISHNA MINES LTD.			
Whistler	10,000	8,000	18,000
Bright Light	1,000	8,000	9,000
Lucky Strike	45,000	24,000	69,000
Galena	2,283,000	20,000	2,303,000
Red Top	13,149,000	30,000	13,179,000
Martha Q**	839,000	18,000	857,000
Gold Dollar	797,000	20,000	817,000
Gold Eagle	3,427,000	24,000	3,415,000
Francis	96,000	30,000	126,000
Little Maud	279,000	30,000	1,191,000
Little Annie	1,143,000	30,000	1,191,000
Little Annie #2	g-1	18,000	g-1
Silver Pick #2	g-2	26,000	g-2
Silver Pick	77,033,000	24,000	77,107,000
Darling	g-2	24,000	g-2
White Hawk	1,402,000	24,000	1,426,000
Water Level	484,000	26,000	508,000
Sulfide	7,000	26,000	33,000
Red 1	4,938,000	-0-	4,938,000
Banjo	650,000	-0-	650,000
Pass	57,000	-0-	57,000
Hard Rock	1,720,000	-0-	1,720,000
Tugboat Annie	112,000	-0-	112,000
TOTAL	**108,472,000**	**410,000**	**108,882,000**
KANTISHNA MINES/MAURICE BUTLER			
Keystone	1,192,000	16,000	1,206,000
Pennsylvania	281,000	28,000	309,000
Pittsburgh	6,000	30,000	36,000
Doherty	6,000	26,000	32,000
TOTAL	**1,485,000**	**100,000**	**1,585,000**

See footnotes at end of table 18.

TABLE 18.- KANTISHNA LODE CLAIMS: ESTIMATED MARKET VALUE
BY OWNERSHIP
DOWL/PLANGRAPHICS.- (Continued)

	Mineral Value ($)	Surface Estate ($)	Market Value ($)
MAURICE BUTLER			
Starr	g-3	22,000	
Friday	2,516,000	22,000	2,600,000
Polywonder	g-3	18,000	
TOTAL	**2,516,000**	**62,000**	**2,600,000**
RAY KRIEG			
Gold King	6,000	12,000	18,000
East Gold King	2,000	30,000	32,000
Blue Bell	2,000	18,000	20,000
TOTAL	**10,000**	**60,000**	**70,000**
PETERSON AUGUST/QUIGLEY LLOYD			
Merry Widow	2,649,000	30,000	2,679,000
Silver King	2,455,000	30,000	2,485,000
TOTAL	**5,104,000**	**60,000**	**5,164,000**
ESTATE OF WM. TAYLER			
Jupiter Mars	320,000	12,000	332,000
Chloride	5,067,000	8,000	5,075,000
Waterloo	6,000	8,000	14,000
Chlorine	1,000	8,000	9,000
TOTAL	**5,394,000**	**36,000**	**5,430,000**

Note -

g-1, grouped with Little Annie
g-2, grouped with Silver Pick
g-3, grouped with Friday

TABLE 19.- LODE CLAIMS: ESTIMATED MARKET VALUE
PATENTED AND UNPATENTED

PATENTED	
Mineral Value	$ 85,774,000
Surface Estate	728,000
	$ 86,502,000
UNPATENTED	
Mineral Value	$ 7,477,000
TOTAL	$93,979,000

CONCLUSIONS

The total estimated 1983 market value of existing claims in Kantishna Hills and the Dunkle Mine study areas exceeds $157 million. This is approximately 30 times greater than previous estimates and does not include the estimated $16 to $20 million in costs associated with value appraisals requisite to purchase negotiations or condemnations of valid claims. Additionally, it should be noted that the mineral wealth of the Kantishna Hills study area is exceptional, the market value of the claims evaluated in this study being only an indicator of the value of precious and strategic minerals within the district.

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APPENDIX A

Claimant:	Location: 33
Estate of William Taylor Box 1368 Fairbanks, AK	T 16S, R 17W sec. 4 & 5
	Red Top Mine Area-Pat. Lo

DOWL/PLANgraphics

KANTISHNA HILLS/DUNKLE MINE
MINERAL VALUATION SURVEY

BLM Claim No. F000226 Date(s) 8/19/83

Claim Name Waterloo Observer(s) Dan Jones/Bob Sanders

Field Contact 1. _____

Contact Type ( ) Owner ( ) Operator (-) Other _____
specify

Field Contact 2. _____

Contact Type ( ) Owner ( ) Operator ( ) Other _____
specify

References cited including individuals, reports, drill logs, etc.

Bundtzen, 1981, p. 203, 220, & plate 1

Sketch dominant features including ore bearing material, access, geologic structures, dimension, etc.

Note: Use back of page for additional notes and adding photographic documentation at later date.

Describe dominant features including geology, topography, access, availability of water, proximity to active claims.

Quartz eye-bearing metafelsite, ± 50' west of graphitic schist HW

Describe geology and mineralization including minerals present (or reported), gangue and spoil materials, structure, placer and load deposits, vein and rock alternation, ore reserves, etc.

C014245

		Bendtsen	Bendtsen	
strike length	–			
Ave. width	–			
Known depth	–			
Ag	–	5.0 oz/ton	79.1	0.27
Au	–	~~0.07~~ oz/ton	0.04	0.0009
Pb	–	48.3%	52.0	0.026
Zn	–	0.072%	0.133	0.165
½ sg	–			

Describe mineral development including surface and underground workings, plant and equipment, location of drill holes, estimated value and utility of equipment.

one trench trans N10°E & lies along a NE fault, 3 small sloughed-in trenches

Describe production history including current status, record of production; compare to adjacent/proximate production activity.

Ranking Notations

In comparison to other similar claims this site is:

1 2 3 4 5

Unexceptional Average Exceptional

Describe rating: _____

_____

_____

_____

_____

_____

Miscellaneous notes and comparisons: _____

_____

_____

_____

_____

_____

_____

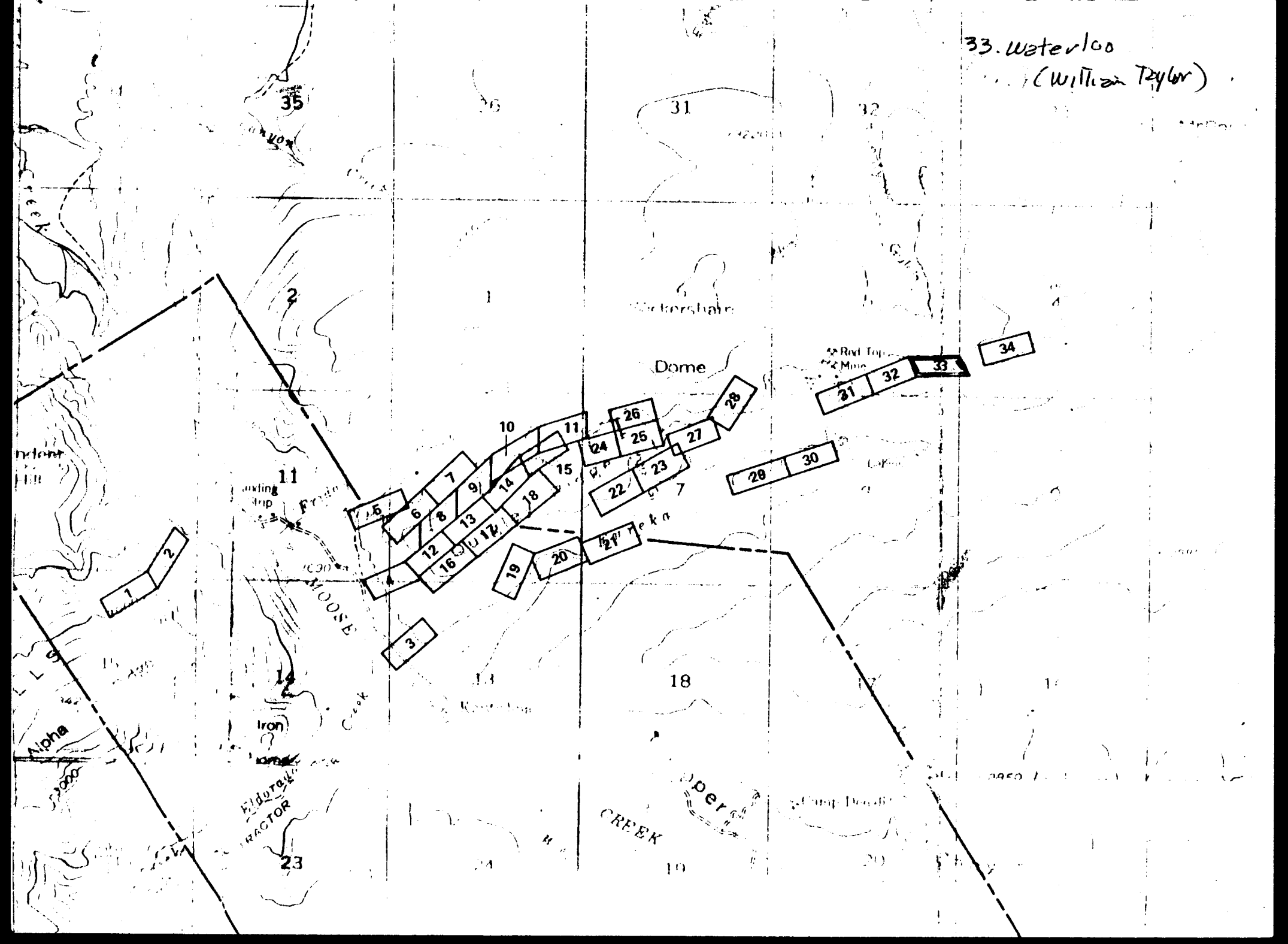
_____

_____

Estimated value of this claim $ _____

Surface estate value (patented claim) $ _____

Total estimated value of this claim $ _____


33. Waterloo
(William Taylor)
Dome
Iron
Alpha
CREEK
MOOSE
35
31
2
1
11
14
13
18
23
10
19
20
21
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APPENDIX B

PLACER MATRIX

1. Workable length of placer under claim
   a. Stream Channel
   b. Bench

2. Workable width of placer under claim
   a. Stream Channel
   b. Bench

3. Workable thickness of placer under claim
   a. Stream Channel
   b. Bench

4. Volume of placer deposit (BCY)
   a. Stream Channel
   b. Bench

5. Unit Resources of ground (incl. reference)

5A. Unit Resources of ground (incl. reference)

5B. Unit Resources of ground (incl. reference)

6. Best estimated resource in place converted to oz/BCY.

7. Fineness

8. Market grades by % weight
   a. Smelter gold (fine and amalgam-stained)
   b. Jewelry
   c. Nugget

9. Original Resource in place oz/BCY
   a. Smelter
   b. Jewelry
   c. Nugget

10. Original resource value in place $/BCY @ $____/oz.
    a. Smelter
    b. Jewelry
    c. Nugget
    d. Total

11. Previously mined - % volume

12. Previous mining recovery factor.
    a. Smelter
    b. Jewelry
    c. Nugget

13. Remaining Resources - oz/BCY
    a. Smelter
    b. Jewelry
    c. Nugget

14. Remaining resource value in place $/BCY @ $____/oz.
    a. Smelter
    b. Jewelry
    c. Nugget

15. Recovery factor for future mining.
    a. Smelter
    b. Jewelry
    c. Nugget

16. Total remaining receivable value
    $_____

APPENDIX C

APPENDIX C.- Adapted from Chadwick (1976)

TABLE 1

Property/Claims(s)	Inferred Reserves cy/T	Est. Pay 1983	Est. Pay 1977	Est. Cost 1983	Est. Cost 1977	Estimated Value ($)	Estimated Value ($)
PLACER	(cy)	($/cy)	($/cy)	($/cy)	($/cy)		
Lower Caribou Creek	500,000	6.274	2.00	$ 0.50	$ 0.50	2,719,500	750,000
Middle Caribou	185,000	9.411	3.00	0.83	0.50	1,587,485	462,500
Upper Caribou	130,000	15.685	5.00	3.34	2.00	1,604,850	390,000
Glacier Creek (All)	500,000	6.274	2.00	1.25	0.75	2,510,750	625,000
Moose Cr. Lower	1,100,000	15.685	5.00	1.67	1.00	15,416,500	4,400,000
Moose Cr. Upper	2,750,000	6.274	2.00	2.04	1.70	11,416,500	2,200,000
Glen Cr. Upper	60,000	15.685	5.00	1.67	1.00	840,900	240,000
Spruce Creek	800,000	12.55	4.00	1.67	1.00	8,702,400	2,400,000
Upper Eureka Cr.	80,000	25.1	8.00	3.34	2.00	1,740,800	480,000
Lower Eureka Cr.	300,000						
LODE	(T)	($/T)	($/T)	($/T)	($/T)		
Gold Dollar	2,160	486	128	$ 167	$ 100	689,040	60,480
Silver Pick	2,850	224	134	167	100	161,823	96,900
Galena	2,100	300	180	175	105	263,025	157,500
Silver King	2,000	820	142	175	105	1,640,000	74,000
Lucky Strike (66-15)	25,000	373	119	128	77	6,125,000	1,050,000
Gold King (66-134)	5,000	373	119	128	77	1,225,000	210,000
Merry Widdow (66-130)	10,000	373	119	128	77	2,450,000	420,000

APPENDIX C.- Adapted from Chadwick (1976)
TABLE 2

Property/Claims(s)	Inferred Reserves (Y)	Est. Pay 1977 ($/Y)	Est. Pay 1983 ($/Y)	Est. Cost 1977 ($/Y)	Est. Cost 1983 ($/Y)	Chadwick Risk Factor	Estimated Value ($)
66-13 Kantishna Dredge Ground Moose Cr. (N.W. Explor. Co) Taybo-Bueno, etc. FF059247-249, FF059256-257	1,100,000	5.00	15.70	1.40	2.35	2.0	7,342,500
66-115 Liberty 22-28, etc. FF059209-215, 222-234	2,750,000	2.00	6.25	.20	.35	5.0	3,245,000
66-96 Caribou Cr. (Howtay Assoc) FF052366-73	4,250,000	2.00	6.25	1.00	1.67	7.0	2,780,700
66-99 Glacier Cr. (Copley, Clark) FF055397-402	1,100,000	2.00	5.25	1.40	2.35	2.0	2,145,000

APPENDIX D

APPENDIX D.- Adopted from Bundtzen (1981;1983)

	Property/Claim Nos.	Estimated Resource (T)	Ag (oz/T)	Au (oz/T)	Pb (%)	Zu (%)	Net Pay ($/T)	Estimated Cost ($/T)	Estimated Value ($)	DGGS Name
	Consolidated Kantishna	3,750	7.8	0.04	0.8	0.5	115	130	-0-	Water Level
66-15	Quigley (Red Top, etc.)	20,407	111.6	0.75	17.6	8.2	1,753	150	2,712,000	Red Top
	Dalton Group (Star Friday)	3,281	45.7	0.29	51.8	4.1	913	150	2,503,000	Dalton Group
	FF001165-70	3,875	8.2	0.05	-0-	-0-	112	130	-0-	Lucky Strike
	FF001172, F001556	23,823	2.9	0.04	17.0	-0-	125	130	-0-	White Hawk
66-134	Gold King, etc.	652	15.2	0.05	7.9	0.3	235	130	68,460	Whistler
	Galena Lode F001309	2,647	54.5	0.10	4.7	5.9	743	150	1,570,000	Galena
	F001479	750	14.1	-0-	16.7	0.2	239	130	81,750	Waterloo
66-30	Taylor Group (Silver King	3,229	16.3	0.03	0.3	-0-	202	130	232,500	Merry Widdow
	F000224-226	5,625	26.6	0.22	7.1	6.4	483	150	1,873,600	Silver King
66-125	Eagle's Den	8,000	1.74	-0-	28.5	-0-	590	250	2,720,000	
	FF059032-033									
66-109	Slate Cr. Lodes	40,000	-0-	-0-	18.66	-0-	373	250	4,920,000	
-110	FF062091-094									
66-96	Last Chance (Caribou Lode)	62,720	0.34	0.05	14.3	-0-	311	250	3,826,000	

APPENDIX D.- Adopted from Bundtzen (1981;1983).- (Continued)

Property/Claim Nos.	Estimated Resource (T)	Ag (oz/T)	Au (oz/T)	Pb (%)	Zu (%)	Net Pay ($/T)	Estimated Cost ($/T)	Estimated Value ($)	DGGS Name
-107 FF052416-421									
66-125 Virginia City (Alpha)	26,470	79.5	0.02	8.9	2.7	994	250	19,694,000	
FF058995-996									
Gold Dollar							150	11,003,000	
Golden Eagle							150	2,467,000	
Frances							150	16,000	
Little Annie							150	8,190,000	
Silver Pick							150	59,802,000	
Keystone							150	2,660,000	
Pennsylvania							192	788,000	
Jupiter-Mars							150	4,487,000	
Banjo							150	14,000	

Note -

Mineral Values
Ag = $11.63/oz
Au = $416.75/oz
Pb = #.22/lb
Zn = $.40/lb

APPENDIX E

APPENDIX E.- Estimation of Inferred Precious Metals in Placer Deposits

Stream, Segment, Deposit*2	1 (ft)	2 (ft)	3 (ft)	4 (M/BCY)	5 (oz/cy)	6 (oz)	7 a/b/c (%)	8 (%)	9 a/b/c (%)	10a (%)	10b (%)	10c (%)	11	12 (oz)	13 (oz)	14 (oz)	15 (oz)	16 ($)
KANTISHNA HILLS STUDY AREA																		
Eureka Ck, upper, SC	10,560	100	4	156.44	0.010	1,564.44	75/20/5	50	70/80/80	18.75	12.0	3.0	.900	686.40	76.27	187.73	46.93	539,000
B	10,560	40	3	46.93	0.008	375.47	75/20/5	0	--	75.0	20.0	5.0	.900	253.44	28.16	75.09	18.77	
mid, SC	5,280	100	9	176.0	0.028	4,928.0	70/25/5	50	40/50/80	56.0	18.75	3.0	.777	2,144.27	615.41	924.00	147.84	1,934,000
Sl	5,280	100	4	78.22	(0.020)	1,564.44	70/25/5	0	--	70.0	25.0	5.0	.777	850.90	244.21	391.11	78.22	
mouth, SC	2,560	150	20	284.44	0.022	6,257.78	70/25/5	80	70/80/80	30.8	9.0	1.8	.777	1,497.59	223.76	563.20	112.64	1,152,000
Sl	2,560	100	3	28.44	0.022	625.78	70/25/5	0	--	70.0	25.0	5.0	.777	340.36	97.68	156.44	31.29	
Friday Cr, upper, SC	2,560	30	5	14.22	0.044	625.78	70/25/5	50	20/50/50	63.0	18.75	3.75	.720	283.85	110.39	117.33	23.47	4,505,000
B	2,560	300	10	284.44	0.044	12,515.56	70/25/5	0	--	70.0	25.0	5.0	.720	6,307.84	2,453.05	3,128.89	625.78	
mid, SC	2,560	30	7	19.91	0.020	398.22	70/25/5	75	50/80/80	43.75	10.0	2.0	.720	125.44	48.78	39.82	7.96	16,330,000
B	2,560	630	42	2,508.0	0.020	50,160.0	70/25/5	10	50/80/80	66.50	23.0	4.6	.720	24,016.61	9,339.79	11,536.8	2,307.36	
mouth, SC	1,320	200	12	117.33	0.021	2,464.00	70/25/5	25	80/90/90	56.0	19,375.	3.875	.720	993.48	386.36	477.40	95.48	5,816,000
B	1,320	460	40	899.56	0.021	18,890.67	70/25/5	25	80/90/90	56.0	19,375.	3.875	.720	7,616.72	2,962.06	3,660.07	732.01	
Slate Cr, all	2,640	50	3	14.67	0.025	366.67	80/15/5	0	--	80.0	15.0	5.0	.780	228.80	64.53	55.00	18.33	129,000
Eldorado Cr, SC	7,920	80	9	211.20	0.020	4,224.0	80/15/5	5	70/80/80	77.2	14.4	4.8	.780	2,543.52	717.40	608.26	202.75	2,058,000
Sl	7,920	100	4	117.33	0.015	1,760.0	80/15/5	0	--	80.0	15.0	5.0	.780	1,098.24	309.76	264.00	88.00	
Spruce Cr, upper, all	2,640	200	5	97.78	0.011	1,075.56	80/18/2	10	70/80/80	74.4	16.56	1.84	.750	600.16	200.05	178.11	19.79	336,000
lower, all	6,600	660	12	1,936.0	0.011	21,296.0	80/18/2	50	70/80/80	52.0	10.8	1.2	.750	8,305.44	2,768.48	2,299.97	255.55	4,574,000
mouth, all	1,320	660	33	1,064.80	0.0025	2,662.0	80/18/2	0	--	80.0	18.0	2.0	.750	1,597.20	532.40	479.16	53.24	898,000

1 = placer length
2 = placer width
3 = placer depth
4 = placer volume
5 = estimated pay
6 = estimated resources
7 = gold - market grades
8 = previous mining
9 = previous recovery by grade
10 = gold, by grade, in place
11 = fineness
12-14 = gold by grade
15 = silver
16 = estimated value

APPENDIX E.- Estimation of Inferred Precious Metals in Placer Deposits.- (Continued)

Stream, Segment, Deposit[*2]	1 (ft)	2 (ft)	3 (ft)	4 (M/BCY)	5 (oz/cy)	6 (oz)	7 a/b/c (%)	8 (%)	9 a/b/c (%)	10a (%)	10b (%)	10c (%)	11	12 (oz)	13 (oz)	14 (oz)	15 (oz)	16 ($)
KANTISHNA HILLS STUDY AREA																		
Rainy Cr, upper, all	6,660	200	5	246.67	0.010	2,466.67	80/18/2	0	--	80.0	18.0	2.0	.750	1,480.00	493.33	444.00	49.33	832,000
lower, SC	3,960	660	22	2,129.60	0.008	17,036.80	80/18/2	15	70/80/80	71.6	15.84	1.76	.750	9,148.76	3,049.59	2,698.63	299.85	13,473,000
B	3,960	660	32	3,097.60	0.008	24,780.80	80/18/2	0	--	80.0	18.0	2.0	.750	14,868.48	4,956.16	4,460.54	495.62	
Glen Cr, E. Fork, SC	6,600	100	4	97.78	0.018	1,760.00	65/30/5	30	70/80/70	51.35	22.8	3.95	.790av	713.97	189.79	401.28	69.52	5,530,000
B	6,600	560	10	1,368.89	0.010	13,688.89	65/30/5	0	--	65.0	30.0	5.0	.780av	6,940.27	1,956.16	4,106.66	684.44	
W. Fork, SC	6,600	100	4	97.78	0.018	1,760.00	65/30/5	0	--	65.0	30.0	5.0	.790av	903.76	240.24	528.00	88.0	5,709,000
B	6,600	560	10	1,368.89	0.010	13,688.89	65/30/5	0	--	65.0	30.0	5.0	.790av	7,029.24	1,868.53	4,106.66	684.44	
Frk Jct, All	660	500	60	733.33	0.028	20,533.33	60/35/5	25	70/80/80	49.5	28.0	4.0	.790	8,029.56	2,134.44	5,749.33	821.33	6,245,000
lower, SC	5,940	100	12	264.00	0.021	5,544.00	60/35/5	50	70/80/80	39.0	21.0	3.0	.790	1,708.11	454.05	1,164.24	166.32	4,508,000
Sl	5,940	600	5	660.00	0.013	8,580.00	60/35/5	0	--	60.0	35.0	5.0	.790	4,066.92	1,081.08	3,003.00	429.0	
Willow Cr, upper, all	6,600	50	4	48.89	0.001	48.89	80/20/0	0	--	80.0	20.0	0	.900	35.20	3.91	9.78	0	18,700
lower, all	6,600	660	12	1,936.00	0.001	1,936.00	80/20/0	0	00	80.0	20.0	0	.900	1,393.92	154.88	387.20	0	739,000
Moose Cr, Spruce to Glen SC	6,600	400	12	1,173.33	0.0025	2,933.33	80/20/0	0	--	80.0	20.0	0	.900	2,112.00	234.67	586.67	0	3,117,000
B	6,600	260	33	2,097.33	0.0025	5,243.33	80/20/0	0	--	80.0	20.0	0	.900	3,776.20	419.47	1,048.67	0	
Glen to Rainy, SC	17,160	500	12	3,813.33	0.004	15,253.33	80/20/0	0	--	80.0	20.0	0	.900	10,982.40	1,220.27	3,050.67	0	9,653,000
B	17,160	160	33	3,355.73	0.003	10,067.20	80/20/0	0	--	80.0	20.0	0	.900	7,248.38	805.38	2,013.44	0	
Below Rainy, SC	9,250	600	12	2,466.67	0.008	19,733.33	80/20/0	0	--	80.0	20.0	0	.900	14,208.00	1,578.67	3,946.67	0	8,110,000
B	9,240	60	25	513.33	0.003	1,540.00	80/20/0	0	--	80.0	20.0	0	.900	1,108.80	123.20	308.0	0	

1 = placer length
2 = placer width
3 = placer depth
4 = placer volume
5 = estimated pay
6 = estimated resources
7 = gold - market grades
8 = previous mining
9 = previous recovery by grade
10 = gold, by grade, in place
11 = fineness
12-14 = gold by grade
15 = silver
16 = estimated value

APPENDIX E.- Estimation of Inferred Precious Metals in Placer Deposits.- (Continued)

Stream, Segment, Deposit*[2]		1 (ft)	2 (ft)	3 (ft)	4 (M/BCY)	5 (oz/cy)	6 (oz)	7 a/b/c (%)	8 (%)	9 a/b/c (%)	10a (%)	10b (%)	10c (%)	11	12 (oz)	13 (oz)	14 (oz)	15 (oz)	16 ($)
KANTISHNA HILLS STUDY AREA																			
Moose Cr,		(1320)[2]+(3960)		(660)															
Eureka to Friday, all				15	2,420.00	0.010	24,200.00	75/20/5	20	70/80/80	64.5	16.8	4.2	.900	14,048.10	1,560.90	4,065.60	1,016.40	8,142,000
Jauhola Group	SC	700	100	3	7.78	0.023	178.89	75/20/5	5	70/80/80	72.375	19.2	4.8	.750	97.10	32.37	34.35	8.59	35,002,000
	B	1,320	3,800	35	6,502.22	0.016	104,035.56	75/20/5	5	70/80/80	72.375	19.2	4.8	.750	56,471.80	18,823.90	19,974.83	4,993.71	
Yellow Cr, undit,	SC	5,280	100	4	78.22	0.010	782.22	60/35/5	50	40/60/70	48.0	24.5	3.25	.900	337.92	37.55	191.64	25,42	4,446,000
	B	5,280	560	12	1,314.13	0.008	10,513.07	60/35/5	0	--	60.0	35.0	5.0	.900	5,677.06	630.78	3,679.51	525.65	
Glacier Cr, upper	SC	26,400	50	4	195.56	0.030	5,866.67	80/18/2	50	60/80/80	56.0	10.8	1.2	.670	2,201.17	1,084.16	633.60	70.40	10,728,000
	B	26,400	130	12	1,525.33	0.020	30,506.67	80/18/2	0	--	80.0	18.0	2.0	.670	16,351.57	8,053.76	5,491.20	610.13	
lower,	SC	14,520	170	4	365.69	0.030	10,970.67	80/18/2	50	60/80/80	56.0	10.8	1.2	.670	4,116.19	2,027.38	1,184.83	131.65	23,899,000
	B	14,520	430	15	3,468.67	0.020	69,373.33	80/18/2	0	--	80.0	18.0	2.0	.670	37,184.11	18,314.56	12,487.20	1,387.47	
		2,640	660																
Caribou Cr, upper	SC	25,740	150	5	715.00	0.019	13,585.00	80/18/2	40	50/70/70	64.0	12.96	1.44	.670	5,825.25	2,869.15	1,760.62	195.62	74,022,000
	B	25,740	510	30	14,586.00	0.019	227,134.00	80/18/2	0	--	80.0	18.0	2.0	.670	121,743.82	59,963.30	40,884.12	4,542.60	
mid	SC	21,780	160	5	645.33	0.015	9,680.00	80/18/2	60	50/70/70	56.0	10.44	1.16	.670	3,631.94	1,788.86	1,010.59	112.29	9,545,000
	B	21,780	500	12	4,840.00	0.005	24,200.00	80/18/2	0	--	80.0	18.0	2.0	.670	12,971.20	6,388.80	4,356.00	484.00	
lower	SC	21,120	200	5	782.22	0.025	19,555.56	80/18/2	20	50/70/70	72.0	15.48	1.72	.900	12,672.00	1,408.00	1,408.00	336.36	56,963,000
	B	15,840 x 660		12	8,964.27	0.018	161,356.80	80/18/2	0	--	80.0	18.0	2.0	.670	86,487.24	42,598.20	42,598.20	3,227.14	
		21,120 x 460																	

1 = placer length
2 = placer width
3 = placer depth
4 = placer volume
5 = estimated pay
6 = estimated resources
7 = gold - market grades
8 = previous mining
9 = previous recovery by grade
10 = gold, by grade, in place
11 = fineness
12-14 = gold by grade
15 = silver
16 = estimated value

APPENDIX E.- Estimation of Inferred Precious Metals in Placer Deposits.- (Continued)

Stream, Segment, Deposit*2	1 (ft)	2 (ft)	3 (ft)	4 (M/BCY)	5 (oz/cy)	6 (oz)	7 a/b/c (%)	8 (%)	9 a/b/c (%)	10a (%)	10b (%)	10c (%)	11	12 (oz)	13 (oz)	14 (oz)	15 (oz)	16 ($)
DUNKLE AREA																		
Colorado Cr, upper SC	5,280	50	2	19.6	0.005	98.0	75/25/0	25	50/75/0	66	20	0	.830	54	10	20	0	172,000
B	5,280	200	2	78.2	0.005	391.0	75/25/0	0	--	75	25	0	.830	243	47	98	0	
lower SC	6,600	100	6	146.7	0.005	734.	75/25/0	25	50/75/0	66	20	0	.830	402	78	147	0	317,000
B	6,600	200	1	48.9	0.005	245.	75/25/0	0	--	75	25	0	.830	153	29	61	0	
mouth all	1,320	660	12	387.20	0.008	3,097.60	75/25/0	15	70/80/0	67	22	0	.830	1,722.58	352.82	681.47	0	951,000

1 = placer length
2 = placer width
3 = placer depth
4 = placer volume
5 = estimated pay
6 = estimated resources
7 = gold - market grades
8 = previous mining
9 = previous recovery by grade
10 = gold, by grade, in place
11 = fineness
12-14 = gold by grade
15 = silver
16 = estimated value

APPENDIX F

APPENDIX F. Estimated In Situ Lode Resource Value: Detailed Calculations

TABLE 1

	Strike Length (ft)	Average Width (ft)	Assumed Depth (ft)	Volume (ft^3)	Volume: Weight Factor (ft^3/T)	Resource Estimate (tons)	Notes	Ag (oz/T)	Au (oz/T)	Pb (%)	Zn (%)
Alpha Ridge											
1 Whistler	75	2.0	35	5,550	8.5	652	1.	8.15	.05	7.9	.03
2 Bright Light	(325)	(17.5)	(17.5)	(569)	(8.5)	(67)	2.	(3.34)	(0.04)*	(2.5)	(.96)
Quigley Ridge											
3 Lucky Strike	125	6.0	62	46,875	12.0	3,875	3.	8.20	0.05	--	--
4 Galena	150	6.0*	75	67,500	8.5	7,941	4.	42.28	.08	2.93	7.4
5 Red Top	295	4.0	147	173,460	5.5	20,407	5.	111.60	0.37	16.4	6.6
A Red 1	(450)	(2.5)	(225)	(253,125)	(8.5)	(29,780)	6.	(36.5)	(.77)	(13.5)	(3.3)
6 Star	g	g*	g	g	g	g		g	g	g	g
7 Friday	g	g	g	g	g	g		g	g	g	g
8 Martha Q	600	0.5	300	90,000	12.0	7,500	7.	42.66	.30	33.3	6.7
9 Polly Wonder	g	g	g	g	g	g		g	g	g	g
10 Gold Dollar	420	3.0	210	264,600	12.0	22,050	8.	12.3	0.18	.08	1.41
11 Golden Eagle	300	1.0	150	45,000	8.5	5,294	9.	13.04	.32	15.11	--
12 Francis	150	0.5	75	5,625	12.0	468	10.	16.44	.36	3.73	--
13 Little Maud	400*	3.0*	200	240,000	12.0	20,000	11.	8.67*	0.08*	.42*	.43
14 Little Annie	600	6.0	300	1,080,000	12.0	90,000	12.	5.89	.09	4.15	.345
15 Little Annie #2	g	g	g	g	g	g		g	g	g	g
16 Silver Pick #2	g	g	g	g	g	g		g	g	g	g
17 Silver Pick	1,200	2.0	600	1,440,000	12.0	169,411	13.	76.3	0.37	1.25	1.25
18 Darling	g	g	g	g	g	g		--	--	--	--
Eureka Creek Bench											
19 White Hawk	450	2.0	225	202,500	8.5	23,823	14.	8.24	.02	12.00	12.00
20 Water Level	150	4.0	75	45,000	12.0	3,750	15.	26.96	0.03	.26	.26
21 Sulfide	150	(2.0)	75	22,500	12.0	1,875	16.	.15	.08	.001	.001

g = grouped

* new information from field examination, grab samples and core drilling

( ) estimated from adjacent claims as noted

APPENDIX F. Estimated In Situ Lode Resource Value: Detailed Calculations

TABLE 1 - Continued

	Strike Length (ft)	Average Width (ft)	Assumed Depth (ft)	Volume (ft^3)	Volume: Weight Factor (ft^3/T)	Resource Estimate (tons)	Notes	Ag (oz/T)	Au (oz/T)	Pb (%)	Zn (%)
Upper Quigley Ridge											
22 Keystone	400	4.0	200	320,000	12.0	26,660	19.	.195	.61	.05	.03
23 Pennsylvania	500	3.0*	250	375,000	12.0	31,250	20.	.135	.212	--	--
24 Gold King	100*	6.0*	50	20,000	12.0	1,667	21.	1.34	.05	.025	.09
25 East Gold King	(50)	(6.0)	25	7,500	12.0	625	22.	1.34	.05	.025	.09
26 Blue Bell	(50)	(6.0)	25	7,500	12.0	625	22.	1.34	.05	.025	.09
27 Pittsburgh	(150)	(2.25)	(75)	(25,313)	(12.0)	(2,110)	23.	(.067)	(.07)	(.07)	(.025)
28 Doherty	(150)	(2.25)	(75)	(25,313)	(12.0)	(2,110)	23.	(.067)	(.07)	(.07)	(.025)
29 Merry Widow	125	5.0	62	38,750	12.0	3,229	17.	62.9	.33	7.5	8.38
30 Silver King	150	6.0	75	67,500	12.0	5,625	18.	55.70	.02	8.60	7.50
Red Top Mine											
31 Jupiter - Mars	780	8.0*	40	249,600	12.0	20,800	24.	7.3	.05	8.86	1.19
32 Chloride	1,400*	8.0*	700	7,840,000	12.0	653,333	25.	3.65	.05	2.03	.640
33 Waterloo	100	1.8	50	9,000	12.0	750	26.	1.44	.03	12.18	.12
34 Chlorine	(50)	(5)	(25)	6,250	(12.0)	521	27.	(.09)	(.05)	(.02)	(.012)
B Banjo	600	3	300	540,000	12.0	45,000	28.	.52	.46	.95	.14
C Hard Rock	(695)	(5.5)	(350)	1,337,875	(12.0)	111,490	28.	(7.3)*	(.05)	(8.86)	(1.19)
D Pass	(300)	(1.5)	(150)	67,500	(12.0)	5,625	28.	(.26)	(.23)	(.48)	(.07)
E Tugboat Annie	(550)	(2.75)	(175)	168,438	(12.0)	14,036	28.	(3.7)	(.03)	(4.43)	(.59)
TOTAL						1,332,349					

g = grouped

* new information from field examination, grab samples and core drilling

( ) estimated from adjacent claims as noted

APPENDIX F. Estimated In Situ Lode Resource Value: Detailed Calculations

TABLE 2

	Ag (oz)	Au (oz)	Pb (lb)	Zn (lb)	Ag $11.63/oz ($)	Au $416.74/oz ($)	Pb 22¢/lb ($)	Zn 40¢/lb ($)	Total ($)	Life of Mine (yrs)	Mining Re. (tons/day
Alpha Ridge											
1 Whistler	5,314	33	103,016	391	61,802	13,753	22,664	156	93,375	.19	10
2 Bright Light	224	3	3,350	1,286	2,605	1,250	737	514	5,106	.02	10
Quigley Ridge											
3 Lucky Strike	31,775	194	--	--	369,543	80,850	--	--	450,393	1.17	10
4 Galena	335,745	635	465,343	1,175,268	3,904,714	264,636	102,375	470,107	4,741,832	2.41	10
5 Red Top	2,277,421	7,551	6,693,496	2,693,724	26,486,406	3,146,879	1,472,569	1,077,490	32,182,344	6.18	10
A Red 1	1,086,970	5,063	8,040,600	1,965,480	12,641,461	2,110,005	1,768,932	786,192	17,306,590	9.02	10
6 Star											
7 Friday											
8 Martha Q	319,950	2,250	4,995,000	1,005,000	3,721,019	937,688	1,098,900	402,000	6,159,607	2.27	10
9 Polly Wonder											
10 Gold Dollar	271,215	3,969	35,280	621,810	3,154,230	1,654,081	7,762	248,724	5,064,797	6.68	10
11 Golden Eagle	386,674	1,694	1,599,847	--	4,497,019	705,975	351,966	--	5,554,960	1.60	10
12 Francis	7,694	168	34,913	--	89,481	70,014	7,681	--	167,176	0.14	10
13 Little Maud	173,400	1,600	168,000	172,000	2,016,642	666,800	36,960	68,800	2,789,202	6.06	10
14 Little Annie	530,100	8,100	7,470,000	621,000	6,165,063	3,375,675	1,643,400	248,000	11,432,538	2.72	100
15 Little Annie #2											
16 Silver Pick #2											
17 Silver Pick	12,925,720	62,678	17,754,278	4,235,000	150,320,309	26,121,056	3,905,940	1,694,000	182,040,305	5.13	100
18 Darling											
Eureka Creek Bench											
19 White Hawk	196,302	476	9,881,780	5,717,520	2,282,992	198,373	2,173,992	2,287,008	6,942,365	7.22	10
20 Water Level	101,100	113	59,250	19,500	1,175,793	47,093	13,035	7,800	1,243,721	1.14	10
21 Sulfide	285	150	3,750	3,750	3,315	62,512	825	1,500	68,152	.57	10

APPENDIX F. Estimated In Situ Lode Resource Value: Detailed Calculations

TABLE 2 - Continued

	Ag (oz)	Au (oz)	Pb (lb)	Zn (lb)	Ag $11.63/oz ($)	Au $416.74/oz ($)	Pb 22¢/lb ($)	Zn 40¢/lb ($)	Total ($)	Life of Mine (yrs)	Mining Re. (tons/day
Upper Quigley Ridge											
22 Keystone	5,299	16,263	26,660	15,996	60,464	6,777,605	5,865	6,398	6,850,322	8.08	10
23 Pennsylvania	4,219	6,625	--	--	49,067	2,760,969	--	--	2,810,036	9.47	10
24 Gold King	2,234	83	834	3,001	25,981	34,590	183	1,200	61,954	0.51	
25 East Gold King	838	31	313	1,125	9,746	12,919	69	450	23,184	0.18	
26 Blue Bell	838	31	313	1,125	9,746	12,919	69	450	23,184	0.18	
27 Pittsburgh	141	148	2,954	1,055	1,640	61,679	650	422	64,391	0.64	10
28 Doherty	141	148	2,954	1,055	1,640	61,679	650	422	64,391	0.64	10
29 Merry Widow	203,104	1,066	484,350	541,180	2,362,100	444,256	106,557	216,472	3,129,385	.90	10
30 Silver King	313,313	113	967,500	843,750	3,643,830	47,093	212,850	337,500	4,214,273	1.70	10
Red Top Mine											
31 Jupiter - Mars	151,840	1,040	3,685,760	495,040	1,765,899	433,420	198,016	198,016	3,208,202	6.30	10
32 Chloride	2,384,665	32,667	27,178,653	8,362,662	27,733,654	13,613,972	5,979,304	3,345,065	50,671,995	19.80	100
33 Waterloo	1,080	23	1,800	1,800	12,560	9,585	40,194	720	63,059	0.23	10
34 Chlorine	47	26	125	125	547	10,836	46	50	11,479	13.64	10
B Banjo	23,400	20,700	855,000	126,000	272,142	8,626,725	188,100	50,400	9,137,367	3.38	10
C Hard Rock	813,877	5,575	19,756,028	2,653,462	9,465,390	2,323,381	4,346,326	1,061,385	17,196,482	2.72	100
D Pass	1,465	1,294	54,000	7,875	17,015	539,275	11,880	3,150	571,320	1.70	10
E Tugboat Annie	51,933	421	1,243,590	165,625	603,981	175,452	273,590	66,250	1,119,273	4.25	10
TOTAL	22,607,721	180,931	111,749,715	31,452,605	262,927,796	35,402,995	24,584,938	12,581,041	375,494,770		

1. Bundtzen #11, Hawley (1977) Averaged grab samples.

2. Bundtzen #12, BOM 1983 grab samples, Hawley (1977) grab used 1/2 physical measurements of adjacent claim - Whistler.

3. Bundtzen #21, used Bundtzen (1981).

4. Bundtzen #20, Average grab less high and low Au sample width modified by BOM field exam.

5. Bundtzen #19, disgarded ore concentrated and high and low grabs.

6. Red 1, unpatented, located between Red Top and Galena, sphere of influence at 50% of adjacent mineral content.

7. Bundtzen #22, grouped Star, Friday, Martha Q, Polly Wonder as Dalton Group, BOM 1983 and Bundtzen (1981) averaged grab less high and low.

8. Bundtzen #26, averaged channel samples did mill lead value Hawley (1977) and Conwell (1974).

9. Bundtzen #25, selected channel samples Seraphim (1961).

10. Bundtzen #23, Seraphim (1961) channel.

11. BOM (1983) drill hole K-5 interval 46.0-49.8.

12. Grouped with Little Annie #2, BOM (1983) drill hole K-3 interval 113.3-115.5.

13. Bundtzen #24, grouped Silver Pick, Silver Pick #2, and Darling, average all samples drop high and low value.

14. Bundtzen #31, BOM (1983) average four grab less high and low.

15. Bundtzen #32, BOM (1983) average grab samples less high and low.

16. Bundtzen #33, average grab samples.

17. Bundtzen #34, Hawley (1977) and Bundtzen Channel average.

18. Bundtzen #34, Bundtzen Channel.

19. Bundtzen #30, BOM (1983) average core and two channels.

20. BOM (1983) average core of two holes.

21. Bundtzen #28 and #29, average grab samples.

22. Bundtzen #28 and #29, average grab sample, length and depth estimate at 1/2 of Gold King.

23. Sphere of influence, East Gold and Pennsylvania, 50% physical characteristics and mineral content, comparable to Bundtzen #38.

24. BOM (1983) drill hole K-16 interval 165.0-174.4.

25. BOM (1983) weighted average of cores K-12, K-14.

26. Bundtzen #44, BOM (1983) average grab less high and low.

27. Bundtzen #46, BOM (1983), width average literature (12') and Waterloo (1.8'), grab samples less high and low, overlaps ridge top unpatented.

28. Bundtzen #35, Table 9, BOM (1983), sphere of influence calculation base Banjo and Jupiter-Mars.