AMPHORA RESOURCES
GEOPHYSICAL REPORT ON AN
AIRBORNE MAGNETIC AND VLF-EM SURVEY
BASIN 1-4, BUNT 1-4, AND ELK 2 & 3 CLAIMS
SKEENA MINING DIVISION
NTS: 104A/4W
LATITUDE: 56° 05'-09'N LONGITUDE: 129° 51'-130° 00'W

AUTHOR: Jeffrey C. Murton, B.Sc., P.Geoph.

DATE OF WORK: FEBRUARY 26, 1990
DATE OF REPORT: JULY 18, 1990

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ILLUSTRATIONS

* Written by Woods (1988)

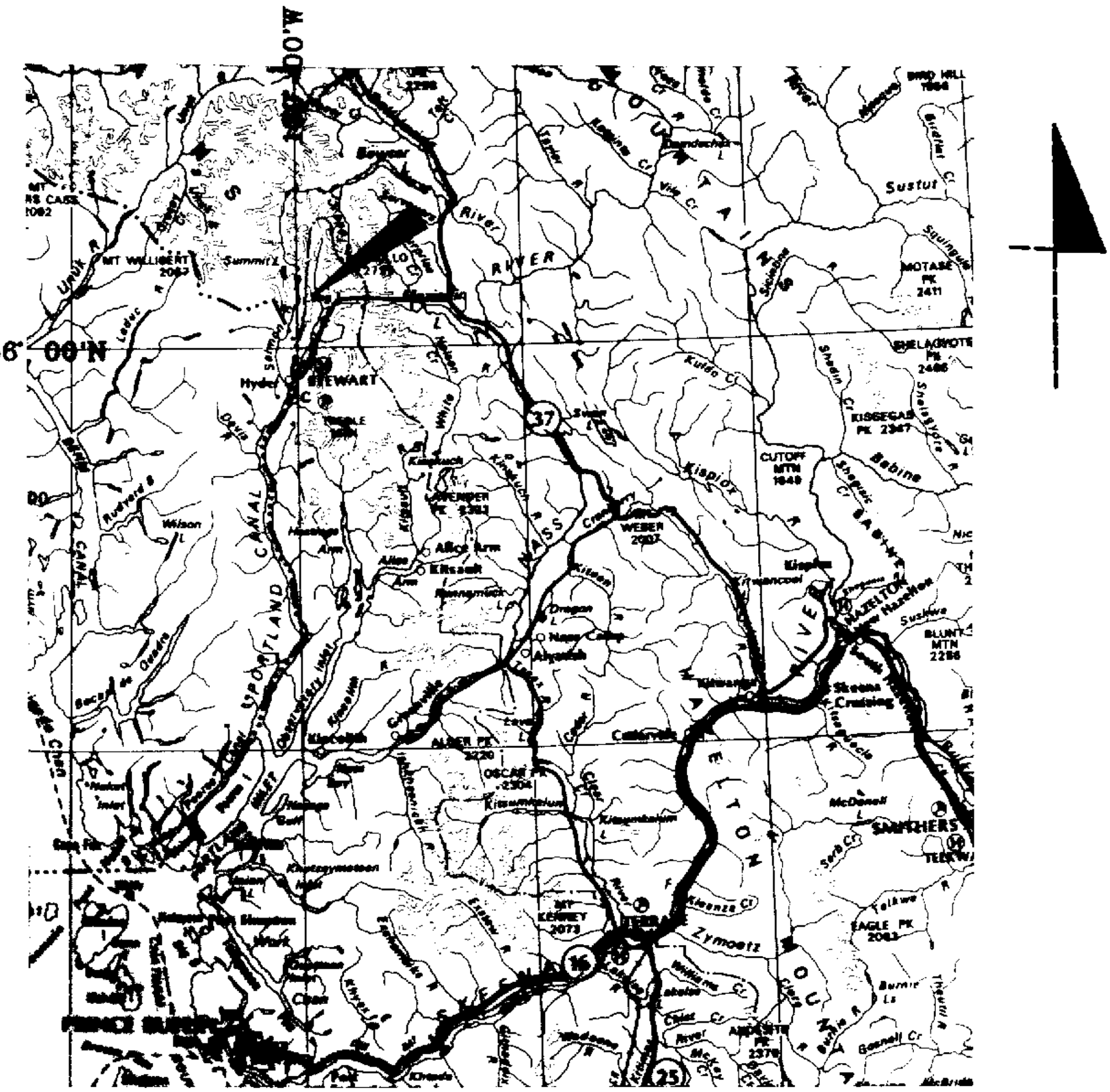
INTRODUCTION:

On February 26, 1990 an airborne reconnaissance magnetic and VLF-EM survey was conducted over the **Basin 1-4, Bunt 1-4, Elk 2 and 3 claims** (also referred to in this report as the **Basin, Bunt, and Elk property**) by Western Geophysical Aero Data Ltd. for **Amphora Resources.** The intention of this survey is to direct further exploration to favorable target areas and to assist in the geological mapping of the property.

Approximately 65.2 line kilometers of airborne magnetic and VLF-EM data have been collected, processed, and displayed in order to evaluate this property. The survey was conducted as two separate grids on either side of Bear River Ridge.

LOCATION AND ACCESS

The **Basin, Bunt and Elk property** is located approximately sixteen kilometres north of Stewart, B.C.(Figure 1). The property area can be divided into two blocks displaced north-south. The east block, encompassing **Basin 1-4** claims, straddles American Creek. The legal corner post of **Basin 1-4** is approximately four kilometers north of Bear River Pass (east of the confluence of Bear River and American Creek). The north border of **Basin 4** lies 300 metres south of the confluence of Basin and American Creeks. The west block displaced south of the east block is situated east of Long Lake, west of Lydden Creek, and 700 metres north of Mount Bunting. The centre of the west block corresponds to Bear River Ridge. There is highway access to the east side of Long Lake, via the Alaska - Yukon highway, which originates in Hyder, Alaska and goes north past the Granduc Mine tunnel, and to the east side of the property Bear River Pass area via the highway between Stewart and Meziadin Junction. Property access was gained by a fifteen minute helicopter charter to the Long Lake - American Creek survey area.



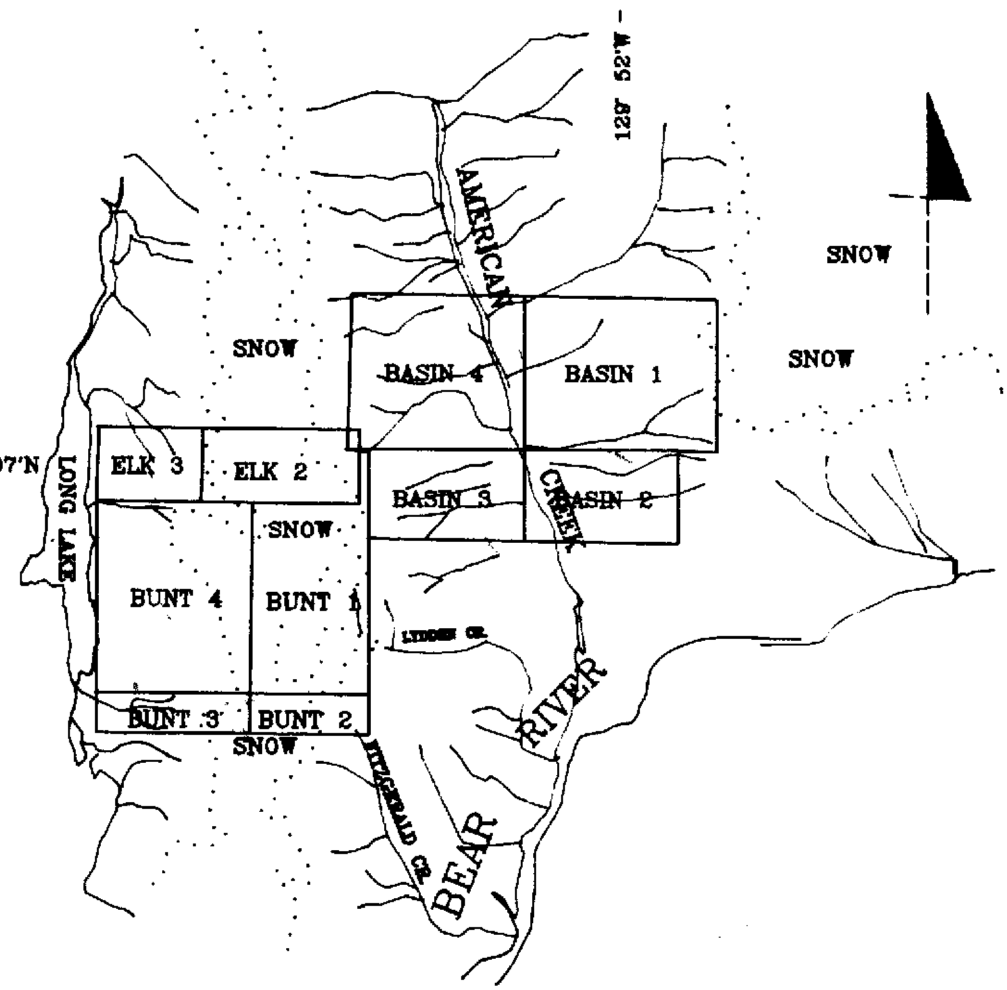
AMPHORA RESOURCES

BASIN 1–4, BUNT 1–4 AND ELK 2 & 3 CLAIMS

LOCATION MAP

NTS: 104A/4W

SCALE 1:2 000 000 **FIG. 1**



AMPHORA RESOURCES

BASIN 1–4, BUNT 1–4 AND ELK 2 & 3 CLAIMS

CLAIMS MAP

NTS: 104A/4W

SCALE 1:100,000

FIG. 2

PROPERTY:

The **Basin, Bunt, and Elk property**, located in the Skeena Mining Division (Figure 2), consists of 120 units and is summarized as follows.

Claim Name	Record Number	Number of units	Expiry Date
Basin 1	7591	20	May 5, 1991
Basin 2	7592	12	May 5, 1991
Basin 3	7593	12	May 5, 1991
Basin 4	7594	20	May 5, 1991
Elk 2	7608	8	May 5, 1991
Elk 3	7609	6	May 5, 1991
Bunt 1	7615	15	May 5, 1991
Bunt 2	7616	3	May 5, 1991
Bunt 3	7617	4	May 5, 1991
Bunt 3	7618	20	May 5, 1991

AREA HISTORY

Mineral exploration in the Stewart-Unuk River area began in the early 1890's when placer miners on their way out of the Cariboo prospected the Unuk River and its tributaries. In 1898, an expedition of placer miners landed at the head of Portland Canal and proceeded to explore the Bear River and Salmon River valleys. The discovery of mineralized float and vein material led to an influx of "hard-rock" prospectors. The townsite of Stewart was established (named after the prospecting family of "Pop", John and Bob Stewart), and by 1910 most of known mineral occurrences in the Stewart area, including the future Silbak Premier mine, had been discovered.

Mine development over the next three decades resulted in slow but steady growth of the Stewart area. In particular, the discovery of high-grade silver and gold ore at Premier in 1918 led to the development of one of the richest mineral deposits in British Columbia and the incentive for intensive exploration and development in the Salmon River basin.

Most of the small mines in the Stewart region were worked out by the 1940's except for the Silbak Premier mine which continued through to the 1970's. Total production of the Premier group consisted of 4 million ounces of gold, 41 million ounces of silver, 4 million pounds of copper, 52 million pounds of lead and 19 million pounds of zinc, making it the second largest silver producer (after Sullivan) and the third largest gold producer (after Bralorne-Pioneer and Rossland) in B.C. The development of the Granduc massive sulphide orebody in the Unuk River area northeast of Stewart and construction of the Cassiar-Stewart-Terrace highway maintained the growth and exploration activity of the Stewart area during the 1960's and 1970's. Significant discoveries in the Iskut River - Stikine River areas north of Stewart have led to an increased intensity of mineral exploration activity in recent years.

Almost all of the early mineral discoveries in the Stewart-Unuk River area have been found by prospecting gossans sighted from accessible stream or river valleys in areas of negligible vegetation. Recent discoveries have results from prospecting mineralized showings revealed by ablating glaciers (i.e. Granduc Mine). Exploration is hampered by dense vegetation at low elevations and snow cover at high elevations. Soil geochemistry is impractical in most areas due to a lack of suitable soil cover. Hence, the best approach to mineral exploration in the stewart-Unuk River area is a combination of geological and geophysical surveying to discover unknown hidden deposits, and detailed reappraisal of known showings using geophysical and geochemical techniques together with modern geological concepts of ore genesis.

REGIONAL GEOLOGY

The Stewart-Unuk River area is composed of three distinct tectonic zones of Mesozoic to Cenozoic age along the western margin of the Cordilleran (Figure 3). From west to east they are: the Coast Plutonic Complex or Crystalline Belt, the Stewart Complex and the Bowser Basin. The Stewart Complex is a deformed belt of volcanic, volcaniclastic and sedimentary rocks of Upper Triassic to Middle Jurassic age which extend from Alice Arm in the south to the Iskut River in the north. These rocks are in intruded contact with Middle Jurassic to Eocene felsic plutonic rocks of the Coast Plutonic Complex to the west, and unconformably underlay the Upper Jurassic to Cretaceous marine clastic sedimentary rocks of the Bowser Basin to the east. The Stewart Complex is one of the most important metallogenic regions in British Columbia.

Stratigraphic nomenclature of the Stewart Complex and Bowser Basin has been adopted from Grove (1986) following modifications from Grove (1971). The oldest rocks of the Stewart-Unuk River area are the Upper Triassic volcanic conglomerates, sandstones and siltstones comprising the Takla Group near Unuk River. In the absence of correlatable fossil evidence, the distinction between these Takla Group volcaniclastics and the overlying Hazelton Group volcaniclastics in not conclusive.

The lowest member of the Jurassic Hazelton Group is the Lower Jurassic Unuk River Formation consisting of green, red and purple volcanic breccia, conglomerate, sandstone and siltstone, pillowed lava and volcanic flows, and minor crystal tuff, limestone and chert. The Unuk River Formation is uncomfortably overlain by the Middle Jurassic Betty Creek Formation of predominantly volcanic breccia, conglomerate, sandstone and siltstone, which, in turn, is unconformably overlain by siltstone, greywacke, sandstone and argillite of the Salmon River Formation. Grove (1971) referred to the Unuk River Formation as the Hazelton assemblage, and the Betty Creek and Salmon River Formation as the Bowser assemblage.

The Upper Jurassic Nass Formation overlies the Salmon River Formation to form the uppermost constituent of the Bowser basin. The Nass Formation consists of a thick sequence of marine clastic sedimentary rocks (siltstones, greywackes, sandstones).

In addition to the volcanic epiclastic and sedimentary rocks of the Unuk River, Betty Creek and Salmon River Formations, the Stewart Complex is also partially composed of their cataclastic and metamorphic equivalents. Cataclasite and mylonite are found near the intruded contract of the Late Jurassic Texas Creek granodiorite. Phyllites, schists and gneisses are confined to the intruded contact areas with the Tertiary Hyder quartz monzonite and Boundary granodiorite.

The Coast Plutonic Complex is composed of multiple phases of intrusion from Upper Triassic quartz diorite in the Unuk river area to Middle Jurassic granodiorites and Tertiary quartz monzonites in the Stewart area. Plutonic satellites of quartz monzonite, quartz diorite and granodiorite are also found toward the centre of the Stewart Complex. Dykes and sills of similar composition are found throughout the Stewart Complex but particularly in well defined zones cutting across the regional geologic trends.

Mineralization in the Stewart area is confined primarily to the Lower and Middle Jurassic Stewart Complex: Unuk River, Betty Creek and Salmon River Formations. Grove (1986) recognizes four classes of mineral deposits such as the Silbak Premier Mines, stratiform massive sulphide deposits such as the Hidden Creek Mine in the Anyox area, discordant massive sulphide deposits such as the Granduc Mine, and Tertiary porphyry copper-molybdenum deposits such as the Mitchell-Sulphurets property. The most important of these, in terms of number of deposits and quantity of ore, are the fissure and replacement vein deposits. However, in terms of exploration potential, all types of deposits have equal importance.

PROPERTY GEOLOGY

The following geological information is from BCMEMPR Bulletin 63:

The Bear River Ridge section has been mapped in detail [by [Grove (1971) and others previously]. The rocks have been described ... as a thick sequence of shallow west-dipping greenstone, agglomerate, tuff, and/or breccia forming the Bear River Formation or Hazelton Group of unknown but probable Jurassic age.

At Bear River Ridge the upper Unuk River [Formation] is dominated by green-coloured, interfingering clastic sedimentary units of predominantly volcanic origin. Siltstones and lithic greywackes are intercalated with coarsely layered volcaniclastic rocks. The siltstones and greywackes provide local markers and define structures. The volcanic conglomerates, breccias, and sandstones have been differentiated by macroscopic features as well as structural contacts, but the fine-grained tuffs and cataclasites required microscopic study in order to clarify and discriminate the various rock types.

The majority of the country rocks in the Salmon River district, originally termed the Bear River volcanics, have been affected by dynamic metamorphism. In general, sufficient primary structures and textures are preserved to allow the sedimentary character of these rocks to be identified. The least altered and deformed strata lie east of Cascade Creek on the upper slopes of Bear River Ridge where they are uncomformably overlain by Salmon River sediments.

At Bear River Ridge, various epiclastic volcanic units vary along strike from volcanic breccia to conglomerate to sandstone to siltstone. The evidence suggests that andesitic volcanism, marked by extensive thick, volcanic breccias, was concentrated immediately east of Bear River Ridge.

The red and green strata [of the Betty Creek epiclastic volcanic sandstone and conglomerate] continue southward along the upper part of Bear River Ridge as easily traceable beds that disconformably underlie dark Salmon River siltstones. At Mount Bunting, there is a rapid facies change from red and green conglomerate and sandstone to red breccia; this change is accompanied by a large increase in apparent thickness.

Porphyritic augite diorite stocks [called Glacier Creek Intrusions] are found at Glacier Creek, Long Lake, and at the entrance to Bear River Pass. In appearance of these augite diorites are distinguishable from the nearby Texas Creek and Hyder batholithic masses, as well as from the

MESOZOIC

JURASSIC

HAZELTON GROUP

UPPER JURASSIC

NASS FORMATION

17 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, ARGILLITE, CONGLOMERATE, MINOR LIMESTONE, MINOR COAL (INCLUDING EQUIVALENT SHALE, PHYLLITE, AND SCHIST)

MIDDLE JURASSIC

SALMON RIVER FORMATION

16 SILTSTONE, GREYWACKE, SANDSTONE, SOME CALCARENITE, MINOR LIMESTONE, ARGILLITE, CONGLOMERATE, LITTORAL DEPOSITS

[redacted] RHYOLITE, RHYOLITE BRECCIA, CRYSTAL AND LITHIC TUFF

BETTY CREEK FORMATION

14 PILLOW LAVA, BROKEN PILLOW BRECCIA (a); ANDESITIC AND BASALTIC FLOWS (b)

13 GREEN, RED, PURPLE, AND BLACK VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE (a); CRYSTAL AND LITHIC TUFF (b); SILTSTONE (c); MINOR CHERT AND LIMESTONE (INCLUDES SOME LAVA (13a)) (d)

LOWER JURASSIC

UNUK RIVER FORMATION

12 GREEN, RED, AND PURPLE VOLCANIC BRECCIA, CONGLOMERATE, SANDSTONE, AND SILTSTONE (a); CRYSTAL AND LITHIC TUFF (b); SANDSTONE (c); CONGLOMERATE (d); LIMESTONE (e); CHERT (f); MINOR COAL (g)

11 PILLOW LAVA (a); VOLCANIC FLOWS (b)

TRIASSIC

UPPER TRIASSIC

TAKLA GROUP (?)

10 SILTSTONE, SANDSTONE, CONGLOMERATE (a); VOLCANIC SILTSTONE, SANDSTONE, CONGLOMERATE (b); AND SOME BRECCIA (c); CRYSTAL AND LITHIC TUFF (d); LIMESTONE (e)

PLUTONIC ROCKS

CENOZOIC

OLIGOCENE AND YOUNGER

9 DYKES AND SILLS (SWARMS): DIORITE (a); QUARTZ DIORITE (b); GRANODIORITE (c); BASALT (d)

EOCENE (STOCKS, ETC.) AND OLDER

8 QUARTZ DIORITE (a); GRANODIORITE (b); MONZONITE (c); QUARTZ MONZONITE (d); AUGITE DIORITE (e); FELDSPAR PORPHYRY (f)

7 COAST PLUTONIC COMPLEX: GRANODIORITE (a); QUARTZ DIORITE (b); QUARTZ MONZONITE, SOME GRANITE (c); MIGMATITE – AGMATITE (d)

MESOZOIC

JURASSIC

MIDDLE JURASSIC AND YOUNGER ?

6 GRANODIORITE (a); DIORITE (b); SYENODIORITE (c); MONZONITE (d); ALASKITE (e)

LOWER JURASSIC AND YOUNGER ?

5 DIORITE (a); SYENOGABBRO (b); SYENITE (c)

TRIASSIC

UPPER TRIASSIC AND YOUNGER ?

4 DIORITE (a); QUARTZ DIORITE (b); GRANODIORITE (c)

HORNBLENDE PREDOMINANT h

BIOTITE PREDOMINANT b

METAMORPHIC ROCKS

TERTIARY

3 HORNFELS (a); PHYLLITE, SCHIST (b); SOME GNEISS (c)

JURASSIC

2 HORNFELS (a); PHYLLITE, SEMISCHIST, SCHIST (b); GNEISS (c); CATACLASITE, MYLONITE (d); TACTITE (e)

TRIASSIC

1 SCHIST (a); GNEISS (b); CATACLASITE, MYLONITE (c)

HORNBLENDE OR AMPHIBOLE DEVELOPED

BIOTITE DEVELOPED

POTASSIUM FELDSPAR DEVELOPED

AREA UNMAPPED

SYMBOLS

ADIT

ANTICLINE (NORMAL, OVERTURNED)

BEDDING (HORIZONTAL, INCLINED, VERTICAL, CONTORTED)

BOUNDARY MONUMENT

CONTOURS (INTERVAL 1,000 FEET) 5000

FAULT (DEFINED, APPROXIMATE)

FAULT (THRUST)

FAULT MOVEMENT (APPARENT)

FOLD AXES, MINERAL LINEATION (HORIZONTAL, INCLINED)

FOSSIL LOCALITY

GEOLOGICAL CONTACT (DEFINED, APPROXIMATE)

GLACIAL STRIAE

GRAVEL, SAND, OR MUD

HEIGHT IN FEET ABOVE MEAN SEA LEVEL +8234'

INTERNATIONAL BOUNDARY

JOINT SYSTEM (INCLINED, VERTICAL)

MARSH

MINING PROPERTY

RIDGE TOP

SCHISTOSITY (INCLINED, VERTICAL)

SYNCLINE (NORMAL, OVERTURNED)

TUNNEL

VOLCANIC CONE

Compilation and geology by E. W. Grove, 1964 to 1970, with additions by N. H. Hannila and R. V. Kirkham, 1966 and James T. Fyles, 1967. Geology of the Alice Arm area by N. C. Carter, 1964 to 1968.

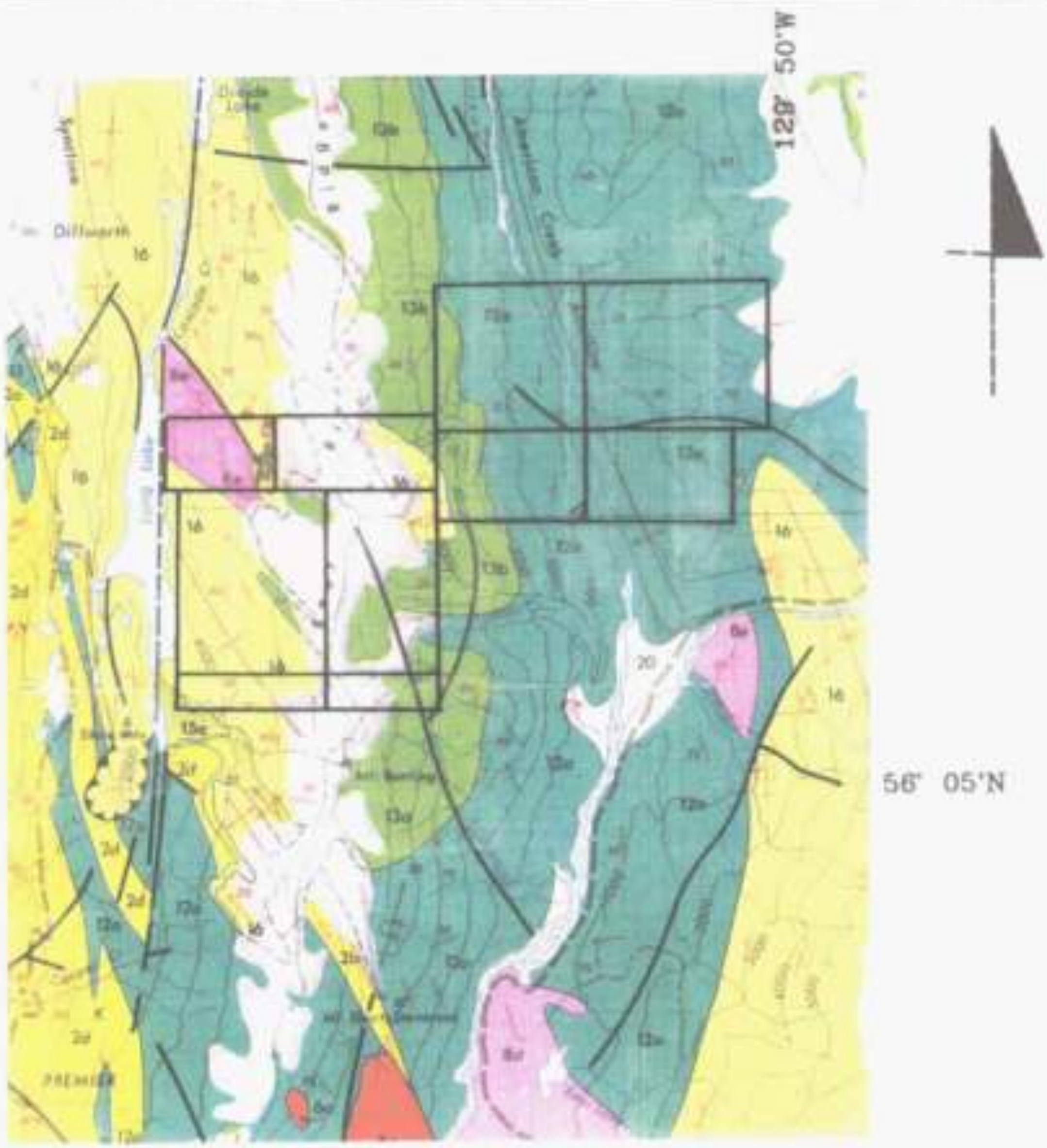
many satellite plutons found within the marginal belt. The rock is massive, dark brownish green, and spotted by coarse euhedral crystals of dark brown altered augite, which commonly forms 15 to 25 per cent of the mass. The matrix is generally fine to medium grained and dark green. Although the Glacier Creek plutons have been called augite diorite for the sake of simplicity, both monzonitic and syenitic phases occur.

The Glacier Creek plutons intruded the Middle Jurassic Salmon River Formation rocks and, in turn were intruded by numerous Tertiary granitic and lamprophyre dykes.

These plutons are cut by "en echelon" groups of coarse, milky-white vuggy quartz veins with local sulphide pods and shoots. Many of these veins have been extensively explored, but no major deposits have been found to date. A number of vein-like, transition replacement, quartz sulphide deposits have also been discovered in the country rocks immediately adjacent to the Glacier Creek stock. [Seven kilometres SW of **Bunt 4** is] a swarm of northwest-trending dykes along the international border between Cantu Mountain and Mount Welker. It has been called the Premier dyke swarm because the Premier orebodies are within it.

The predominate lithology on the **Basin 1-4 claims** is the Lower Jurassic Unuk River Formation. The Unuk River Formation in this area is characterized as green, red, and purple volcanic breccia, conglomerate, sandstone, and siltstone. Approximately 600 metres south of the SW corner of **Basin 1** is a contact of the Middle Jurassic Salmon River Formation siltstone sequence.

On the west block, the centre of the **Elk and Bunt claims** straddle Bear River Ridge. The west border of this block roughly corresponds to the east shore of Long Lake. **Bunt 3 and 4 claims** are predominantly Salmon River Formation silts. On the SW corner of **Bunt 3** is an approximately NW striking contact of the Salmon River silts with the Betty Creek Formation pillow lava and broken pillow breccia. Striking NW though **Bunt 4** are two contacts with the Salmon River rocks. On the east side of the claim the contact is with the Betty Creek epiclastic volcaniclastics.



AMPHORA RESOURCES

BASIN 1-4, BUNT 1-4 AND ELK 2 & 3 CLAIMS

PROPERTY GEOLOGY

NTS: 104A/4W

SCALE 1:100,000

FIG. 3

AIRBORNE MAGNETIC AND VLF-EM SURVEY:

This geophysical survey simultaneously monitors and records the output signals from a Barringer Research proton precession magnetometer and a Herz dual-frequency VLF-EM receiver. The sensors are installed in an aerodynamically stable "bird" which is towed thirty metres below a helicopter where possible. Fixed to the helicopter skid is a shock and gimbal-mounted, downward-facing video camera. A video signal is recorded and later reviewed and correlated with a recent air photograph in order determine the precise locations of the flight paths. The elevation of the helicopter above the ground is recorded by a radar altimeter and monitored by the pilot and navigator in order to maintain a constant ground clearance.

A computer records readings of the magnitude of the earth's magnetic field and of the fields induced by two powerful VLF-EM transmitters (located in Annapolis, Maryland and Seattle, Washington). These data, the time and date they were observed, radar altimeter values, and survey fiducial points are all superimposed on the video image and recorded on both video cassettes and 3.5 inch computer diskettes. On the magnetic portion of this airborne survey an intermittent problem with the magnetometer sensor was encountered. The spurious noise bursts have been edited from original data and displayed in profile form (Figure 5).

Data quality is assured by the survey operator monitoring a real-time display of direct and unfiltered recordings of all the geophysical output signals while a navigator directs the helicopter pilot from an air photograph.

Magnetic (Figures 5 & 6) data is useful for mapping the position and extent of regional and local geological structures which have varying concentrations of magnetically susceptible minerals. Many lithological changes correlate with a change in magnetic signature.

VLF-EM data is useful for mapping conductive zones. These zones usually consist of argillaceous graphitic horizons, conductive clays, water-saturated fault and shear zones, or conductive mineralized bodies. The VLF-EM data is presented as contoured total field data overlain by quadrature (out-of-phase component) profiles. Conductors are located at inflection points or a change in sign (cross-over) of the quadrature component over a local total field VLF-EM high.

In a typical VLF-EM survey, satisfactory conductor coupling and imaging occurs only within 45° of the primary field selected. For maximum coupling, and in turn, optimum imaging, a transmitter should be selected in the same direction as geologic strike.

DATA PROCESSING:

The video image, with superimposed line and fiducial identification, recording times, and the recorded data, is correlated with both the navigator's and operator's field notes and topographic features observed from an air photograph. The "recovered" flight paths are digitized to obtain relative x and y positions which are then combined with the data. Subsequently, all geophysical data is filtered to remove spurious noise bursts and chatter, and then plotted as flight path profiles and contour maps for each of the sensors.

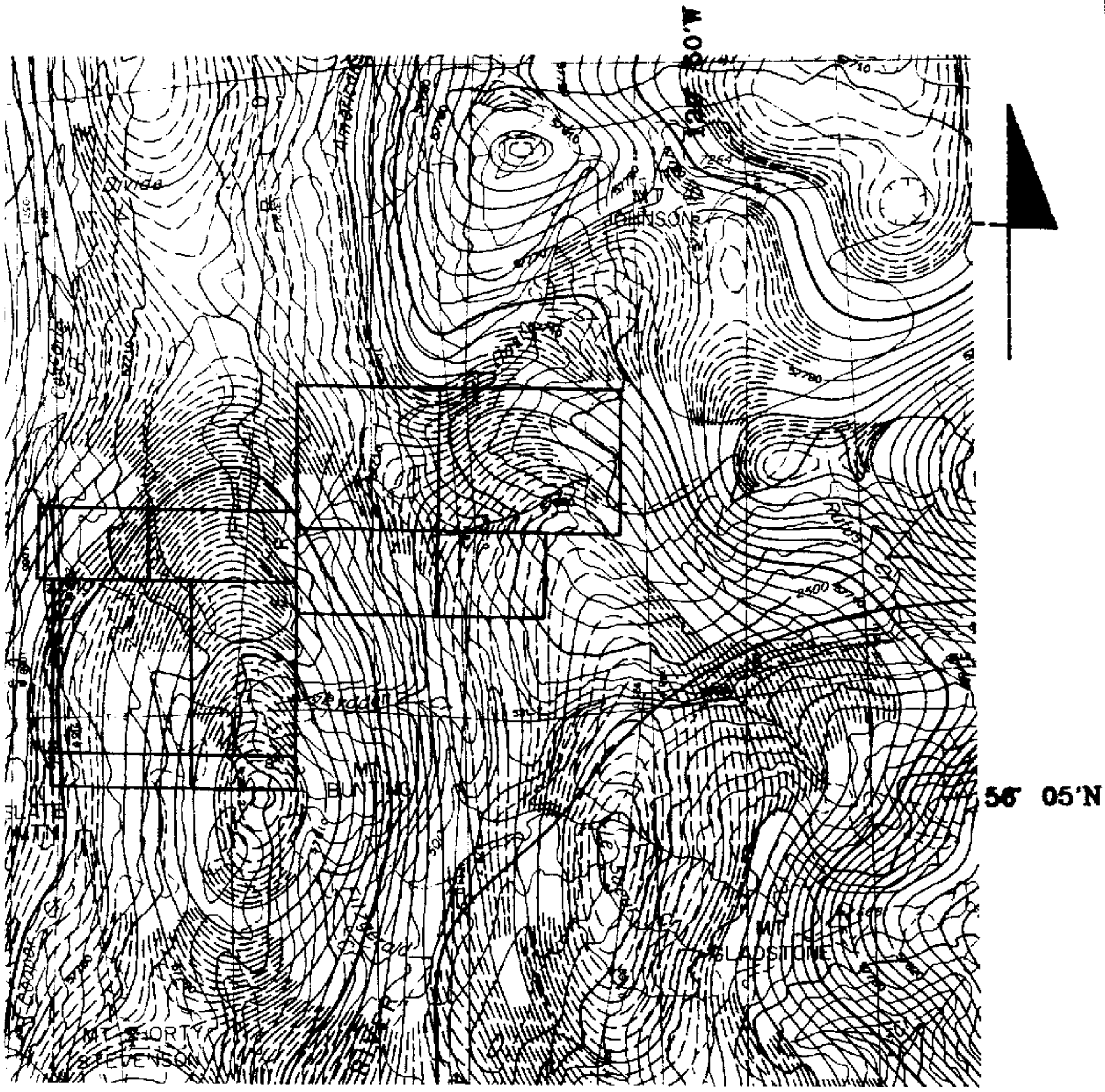
Both the total field magnetometer signal and the total field and quadrature components of VLF-EM signal are sensitive to topographic changes and bird oscillations. Short wavelength (less than 200 meters) oscillations, are attenuated by filtering the VLF-EM and the magnetic data and with a digital low-pass filter. Long wavelength effects (anomalies greater than 2000 metres), attributed to broad topographic features, are also removed from both the VLF-EM channels by high-pass filtering.

DISCUSSION OF RESULTS:

The west side of the **Basin, Bunt, and Elk property** was surveyed on February 26, 1990. Over 65.2 line kilometers of airborne magnetic and VLF-EM survey data have been recorded and evaluated for this property. Survey lines were flown on two grids in a Hughes 500D helicopter with an average spacing of 300 metres. The west grid was flown between the east shore of Long Lake and the western extent of the icefield on top of Bear River Ridge. The east grid straddles American Creek; the flight lines are flown between the east side of Bear River Ridge and SW of Champion Creek. The geophysical survey data were recorded on average three times per second for an effective sample interval of 15 metres. The sensors were towed below the helicopter with an average terrain clearance of 30 metres where possible.

VLF-EM conductors corresponding to Seattle and Annapolis transmitters have been interpreted and numbered on the Geophysical Interpretation Map (Figure 11). The Seattle data displays a better response on this survey than the Annapolis data. The better Seattle frequency response is probably due to a closer transmitter location than the more-distant Annapolis, Maryland location. The strongest conductors are observed on the slope between Long Lake and Bear River Ridge. Good conductors exhibit strong in-phase crossovers, the quadrature usually lags by up to 90 degrees or mirrors the in-phase response, and the total field is a local high. Conversely for poor conductors, the quadrature response nearly mimics the in-phase and there are no strong in-phase crossovers and, in some cases, no associated total field anomalies. Poor conductors may be associated with conductive overburden, weathered bedrock, and, at lower elevations, conductive effects in swampy areas.

The survey areas are located where steep topographic changes were encountered. In any airborne geophysical survey an increase in the ground-to-sensor distance by five metres is noteworthy and by



AMPHORA RESOURCES

BASIN 1–4, BUNT 1–4 AND ELK 2 & 3 CLAIMS

GSC AREOMAGNETIC MAP

NTS: 104A/4W

SCALE 1:100,000 **FIG. 4**

ten metres is significant. The effect of separation increases of this magnitude upon the magnetic and VLF-EM responses is a marked reduction in measured intensity. Increased sensor-ground separation attenuates the geophysical response and results in the appearance of a mappable magnetic or VLF-EM low. In many geological settings the location of ravines, creeks, and rivers correspond to either the surface expression of fault and shear zones, or lithological contacts and are likely areas to observe significant VLF-EM conductors. In part, the VLF-EM response, and to a lesser extent the magnetometer response, may have been "over-printed" or attenuated in these areas by increased separation effects thus masking conductors that might be observed on a ground survey.

The GSC regional magnetic data (Figure 4) shows six flight lines which intersect the property area. The GSC magnetic contours appear to follow the gross topographic trends; an area magnetic high occurs in the vicinity of Mount Bunting - a few hundred metres south of Bunt 2.

Three geologic/magnetic contacts have been interpreted on the west survey grid between Lines 5 and 12. The magnetic signature of these contacts is an area of significant change in the recorded level. An intermittent problem was experienced with the magnetometer sensor. The spurious magnetic values recorded were deleted and the magnetic profiles were plotted (Figure 5) then gridded and contoured to produce Figure 6. The geologic/magnetic contacts are represented on the Geophysical Interpretation Map (Figure 11) as two parallel lines - one continuous, the other dashed. In places where the interpreted contacts intersect flight lines where spurious magnetic data was deleted and the contoured magnetic data is interpolated from data on adjacent lines, the contact is represented by two parallel dashed lines.

Overall, the VLF-EM response on the west half of the survey area is parallel to the topography. Two faults have been interpreted which correspond to conductor pairs A10-S15 and A11-S17. These faults are also coincident with air photo lineations as is the north part of conductor S14, between Lines 1 to 3. On Lines 10 to 12, conductor pair A4-S8 and the adjacent interpreted geologic/magnetic contact parallels a ridge isolated to the east and west by glacial cover. There are a number of oblique-to-topography or "cross-cutting" conductors recognized on the west grid; the longest is the conductor pair A8-S13 lying between Lines 6 and 8. Elsewhere on this grid are relatively short, "cross-cutting" conductors S12, S16, and S18.

Two geologic/magnetic contacts have been interpreted on the east grid survey. The west contact, on Basin 3 and 4, trends north-south, spanning Lines 14 to 21. This feature reflects the contact of the west-ward, more magnetic Betty Creek Formation with the Unuk River Formation. The second contact, trending approximately NNE, is immediately east of American Creek and south of Champion Creek. The most prominent VLF-EM features on the east grid are conductors A3-S3, and S4 on Lines 14 to 17. Conductor S4 lies parallel and 350 metres up-slope east of American Creek. Conductors A3-S3 obliquely cut Champion Creek. Also noteworthy is conductor S6 on Lines 14-16 which is nearly coincident with air photo lineations. Conductor S6 lies within the Betty Creek volcanics and is coincident with an interpreted fault.

CONCLUSIONS AND RECOMMENDATIONS

The **Basin, Bunt, and Elk property** is located in an area of promising mineralogical potential. Numerous mineral showings have been documented adjacent to the property; on the north and south ends of Long Lake, at Bear River Pass, at Lydden Creek, and in the vicinity of the tributary streams feeding American creek.

Airborne geophysical surveys were conducted on two survey grids on the east and west side of the property. The west survey area is situated between Long Lake and Bear River Ridge. The east survey area is located east of Bear River Ridge and north of Bear River Pass, straddling American Creek. The geology of Bear River Ridge and the American Creek area is well documented in BCMEMPR Bulletin 63 (Grove, 1986). Many sulphide mineral occurrences have been documented in the volcanic and epiclastic rocks.

Magnetic data displaying elevated magnetic levels were recorded on **Bunt 3 and 4** - the area predominantly mapped as the Salmon River Formation silts. On other previous airborne surveys in the Stewart area, a poor magnetic response is typical of Salmon River sediments which usually contain low concentrations of magnetic minerals relative to adjacent rocks of volcanic origin. Scant Salmon River rock cover with near-surface, more-magnetic Glacier Creek augite diorite or Betty Creek epiclastic volcanic rocks would create the observed west side magnetic signature. On the east side, in the area associated with **Basin 3 and 4 claims**, a geologic/magnetic contact was interpreted where there was a marked increase in magnetic level. This feature corresponds to the mapped contact between the more magnetic Betty Creek epiclastic volcanics with the Unuk River volcanics on Figure 3.

A ground examination must be made to verify the geophysical interpretations presented in this report. It is recommended that a follow-up search of all sources for additional geological information, geophysical signatures, and any descriptions of past work on these and adjacent claims be undertaken - including those two post claims located along Lydden Creek.

Subsequent to this search effort, a program of geological mapping should be undertaken in two phases. The first phase, should be conducted on the west grid - an area of good rock exposure and reduced vegetation - to verify the position and presence of the postulated faults, geological contacts, and/or mineralization with the interpreted conductors and airphoto lineations. The second phase is on the east grid - an area of increased vegetation cover. This phase should evaluate those "cross-cutting" conductors and the geologic/magnetic contacts.
Subsequent to the proposed information search and geological verification of the geophysical features interpreted in this report, a follow-up program of ground EM geophysical surveying could be conducted over those airborne geophysical anomalies which are found to be located in a promising geological setting. Additionally soil samples should be collected from the intersecting drainages.

Respectfully submitted,

Jeffrey C. Murton, B.Sc., P.Geoph.(APEGGA)

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STATEMENT OF QUALIFICATIONS

NAME:	MURTON, Jeff C.
PROFESSION:	Geophysicist
EDUCATION:	B.Sc - Geophysics Major University of British Columbia
PROFESSIONAL ASSOCIATIONS:	Society of Exploration Geophysicists Association of Professional Engineers, Geologists, and Geophysicists of Alberta
EXPERIENCE:	1984-88 - Geophysicist, Interactive Graphics with Western Geophysical Company of Canada Ltd. in Calgary, Alberta. 1988 - Geophysicist with White Geophysical Inc.

INSTRUMENT SPECIFICATIONS

BARRINGER AIRBORNE MAGNETOMETER

Model:	M 1041
Type:	Proton Precession
Range:	20,000 to 100,000 gammas
Accuracy:	+ 1 gamma at 24 V d.c.
Sensitivity:	1 gamma throughout range
Cycle Rates:	Manual: Pushbutton single cycle
	External: Actuated by a contact closure (short) longer than 10 microseconds
	Continuous: 1.114 seconds with external pins shorted
	Internal: 1 second to 3 minutes in 1 second steps
Outputs:	Analogue: 2 channels, 0 to 99 gammas or 0 to 990 gammas at 1 m.a. or 100 mV full scale deflection
	Digital: Parallel output 5 figure 1248 BCD, TTL compatible
	Visual: 5 digit numeric display directly in gammas
Size:	Instrument set in console
	19" x 3.5" x 10"
Weight:	10.6 lbs.
Power Requirements:	28 ± 5 volts dc, @ 1.5 amps - polarizing 4 amps
Detector:	Noise cancelling torroidal coil installed in air foil

INSTRUMENT SPECIFICATIONS

HERZ TOTEM - 2A VLF-EM SYSTEM

Primary Source:	Magnetic field component radiated from VLF radio transmitters (one or two simultaneously)
Parameters Measured:	Total field, vertical quadrature, horizontal quadrature and gradient
Frequency Range:	15 kHz to 25 kHz; front panel selectable for each channel in 100 Hz steps
Sensitivity Range:	130 µV m to 100 mV at 20 kHz, 3 dB down at 14 kHz and 24 kHz
VLF Signal Bandpass:	-3 dB at +/- 80 Hz; < 4% variation at ±50 Hz
Adjacent Channel Rejection:	300 to 800 Hz = 20 to 32 dB; 800 to 1500 Hz = 32 to 40 dB; > 1500 Hz > 40 dB (for < 2% noise envelope)
Out of Band Rejection:	10 kHz to 2.5 Hz = 5 x 10^{-4} Am to 5 x 10^{-1} Am < 2.5 kHz rising at 12 dB octave 30 kHz to 60 kHz = 5 x 10^{-4} Am to 8 x 10^{-3} Am > 60 kHz rising at 6 dB octave (for no overload condition)
Output Span:	±100% = ±1.0 V
Output Filter:	Time constant 1 sec. for 0% to 50% or 10% to 90% noise bandwidth 0.3 Hz (second order LP)
Internal Noise:	1.3 µV m rms (ambient noise will exceed this)
Sferics Filter:	Reduces noise contribution of impulse filter
Electric Field Rejection:	<0.5% error for 20 m tow cable
Controls:	Power switch, frequency selector switches (Line and Ortho), meter switch (Total Quad), and sferics filter switch
Displays:	Meters (Line and Ortho), sferics light, overhead light

HERZ TOTEM - 2A VLF-EM SYSTEM - PAGE 2

Inputs:	Power: 23 to 32 V DC; fused 0.5 Amps
	Signal: Sensor upper; sensor lower
Outputs	Total, quad, gradient, multiplexed (line and ortho.)
	Audio monitor, stereo line and ortho
Dimensions and Weight:	Console: 480 mm wide x 45 mm high x 340 mm deep, 3.8 kg
	Sensor and Preamplifier Assembly: 150 mm diameter x 460 mm long, 1.5 kg

INSTRUMENT SPECIFICATIONS

DATA ACQUIISITION UNIT

Model:	HP-3852A
Mainframe Supports:	Eight function module slots
	Data acquisition operating system
	System timer
	Measurement pacer
	Full alphanumeric keyboard, command and result displays
Number of Channels:	20 channel relay multiplexer HP44708A/H
Voltmeter:	5½ to 3½ digit intergrating voltmeter HP44701A measures:

DC voltage

resistance

AC voltage

Range ±30V, ±0.008%, +300uV

Intergration Time 16.7 msec

Number of converted digits 6½

Reading rate (readings/ sec)	57
Min-Noise rejection (dB) Normal Mode Rejection at 60 Hz ±0.09%	60
DC Common Mode Rejection with 1 KΩ in low lead	120
Effective Common Mode Rejection at 60 Hz ±0.09% with 1 KΩ in low lead	150

Communication:	HPIB interface with Compaq
Power Requirements:	110/220 Volts AC at 60/50 Hz
Dimensions:	45.7 cm x 25.4 cm x 61.0 cm
Weight:	9.5 kg.

INSTRUMENT SPECIFICATIONS

CONTROLLER AND RECORDING SYSTEM - SPECIFICATIONS

Type:	Compaq Portable II
	An 80286 microprocessor
	640 Kbytes of RAM
	2 three and a half inch 720 Kbyte drives one 20-Megabyte fixed disk drive
	Monochrome, dual-mode, 9-inch internal monitor
	Asynchronous communications interface
	Parallel interface
	Composite-video monitor interface
	RGB monitor interface
	RF modulator interface
	Two expansion slots
	Real-time clock
	An 80287 coprocessor
	A HPIB Interface Card
Data Storage:	3 1/2 inch diskettes in ASCII
	Roland 1012 printer for printed output
	Beta I video cassettes
Power Requirements:	115 Volt AC at 60 Hz
Weight:	11 kg
Dimensions:	45 cm x 25 cm x 30 cm

INSTRUMENT SPECIFICATIONS

FLIGHT PATH RECOVERY SYSTEM

T.V. Camera:	Model:	RCA TC2055 Vidicon
	Power Supply:	12 volt DC
	Lens:	Variable, selected on basis of expected terrain clearance
	Mounting:	Gimbal and shock mounted in housing, mounted on helicopter skid
Video Recorder:	Model:	Sony SLO-340
	Power Supply:	12 volt DC / 120 volt AC (60Hz)
	Tape:	Betamax ½" video cassette - optional length
	Dimensions:	30 cm X 13 cm X 35 cm
	Weight:	8.8 Kg
	Audio Input:	Microphone in - 60 db low impedance microphone
	Video Input:	1.0 volt P-P, 75 unbalanced, sync negative from camera
Altimeter:	Model:	King KRA-10A Radar Altimeter
	Power Supply:	0-25 volt (1 volt/1000 feet) DC signal to analogue meter, 0-10 v (4mv/ft) analogue signal to data acquisition unit
	Mounting:	Fixed to T.V. camera housing, attached to helicopter skid

COST BREAKDOWN:

DESCRIPTION	TOTAL
Survey totals for the Basin, Bunt, and Elk claims	
Mobilization and demobilization, 2 men, Brent Robertson and Gerald MacKenzie..................	$ N/C
Data Acquisition:	
-Total daily charges for vehicle rental instrument rental, labour, room and board	$ 2,258.20
-Airborne geophysical surveying (February 26, 1990) (65.2 km @ $49.00/km)	$ 3,194.80
Data processing and report charges	$ 4,147.00
Total	**$ 9,600.00**
Allocation of charges to the Basin Group	
Mobilization and demobilization..................	$ N/C
Data Acquisition (February 26, 1990)................	$ 2,908.27
Data processing and report charges	$ 2,211.73
Subtotal	**$ 5,120.00**
Allocation of charges to Elk 2 & 3 and Bunt 1-4 claims	
Mobilization and demobilization..................	$ N/C
Data Acquisition (February 26, 1990)..............	$ 2,544.73
Data processing and report charges	$ 1,935.27
Subtotal	**$ 4,480.00**