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REPORT ON GEOCHEMISTRY, GEOLOGY
AND RADIOMETRIC SURVEY

GUANO 1-22 CLAIMS
GUAYES 23-30

WATSON LAKE MINING DISTRICT
CLAIM SHEET 105F/8, 105F/9

Latitude $61^{\circ}30'$

Longitude $132^{\circ}25'$

20 January 1977

A. R. Archer
E. P. Onasick

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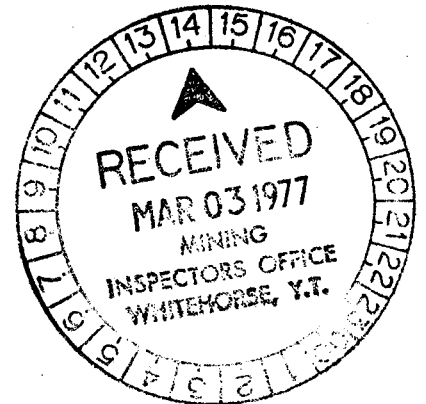
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GUANO PROPERTY

INTRODUCTION

The Guano uranium (and associated thorium, columbium and rare earth) showings were found in 1976 by Ukon Joint Venture (Chevron Canada Limited and Kerr-Addison Mines Limited) managed by Archer, Cathro & Associates Limited. The field crew was comprised of geological engineer Eric P. Onasick and prospector W. Doug Eaton, and was supervised by R. J. Cathro. Regional reconnaissance by airborne spectrometry discovered anomalous radioactivity in a fluorite-bearing syenite near the junction of McConnell River and White Creek on 24 June 1976. Subsequent local flying discovered two sharp anomalies in close proximity on a north-trending ridge about 2.8 miles (4.5 km) to the east. A groundcheck of these anomalies found strong radioactive float associated with a skarnlike mineral assemblage, on which were staked fourteen Guano claims. After a more through examination of the prospect (9 August 1976) four additional Guano claims were adjoined to the northwest to cover another small zone of radioactivity, and on 31 August 1976 another four Guano claims extended the group to the north to cover the possibility of radioactive mineralization under the overburden in that direction. Finally, after discovery of more radioactive float on the eastern flank of the ridge during work in the period 18 - 21 September 1976, eight Guayes claims were added on 19 September 1976 to complete the thirty-claim group. Work by UJV included reconnaissance mapping of the fluorite-bearing syenite to the west of the claims as well as parts of the claim area itself. The mineral assemblage is complex containing thorium, niobium, and rare earths as well as uranium. This mineralization appears to be associated with a skarn zone developed at the contact of the syenite stock, although it has many mineralogical and petrological features of a carbonatite. Regional

geology and geochemistry are illustrated on Figure U-GU1, and a large scale map of geology and geochemistry within the claim boundary is given in Figure U-GU2 (in the pocket).

PROPERTY, LOCATION AND ACCESS

The Guano property consists of thirty contiguous mineral claims recorded in the Watson Lake Mining District as follows:

| <u>CLAIM NAME</u> | <u>GRANT NUMBERS</u> | <u>EXPIRY DATE</u> |
|-------------------|----------------------|--------------------|
| Guano 1-14 | YA242-YA255 | 20 July 77 |
| Guano 15-18 | YA563-YA566 | 20 August 77 |
| Guano 19-22 | YA945-YA948 | 7 September 77 |
| Guayes 23-30 | YA11192-YA11199 | 24 September 77 |

The claims are located at latitude $61^{\circ}30'$ north and longitude $132^{\circ}25'$ west, straddling claim sheets 105 F/8 and 105 F/9, 36 miles (58 km) south of Ross River and 106 miles (170 km) northeast of Whitehorse. Access was by helicopter from Whitehorse or Ross River, as well as from camps on the South Canal Road. A tote trail servicing the Seagull Creek area is presently driveable in dry weather as far as Grayling Lake, 6 miles (10 km) west of the Guano showing. There are no lakes in the immediate area suitable for float planes.

GEOMORPHOLOGY AND GLACIATION

The property is situated in the rugged Pelly Mountains, a region of above-normal rain and snowfall on the southwest side of the Tintina Trench. Peaks reach elevations of up to 7,000 feet (2100 m) with local relief approximately 2,500 to 3,000 feet (800 to 1000m). Ice covered the area during the Pleistocene, moving west and northwest along the major valleys controlled strongly by stratigraphic

and structural trends in the Pelly Mountains. Scoured valleys and hanging cirques are common, and a prominent terrace along the Guano 1-14 claim line is probably a glacial feature. The area is drained by creeks to the McConnell River and then to the Nisutlin and Teslin Rivers. Vegetation is sparse about 4,500 feet (1370 m) elevation, but includes grasses, buckbrush and some conifer growth below that.

GEOLOGY AND MINERALIZATION

In the Guano region, a syenite stock of Mississippian (?) age has intruded a Lower Paleozoic sequence of carbonates and clastic rocks overlain by Mississippian (?) acid to intermediate submarine explosive volcanic rocks and black slate that grades laterally into thin-bedded pale green tuffaceous chert with minor shale and siltstone. The syenite is thought to be a subvolcanic relative to the volcanic rocks, occurring as several small plugs within them. The oldest member in the sequence, a grey to black lustrous phyllite, occurs around the northern and eastern parts of the claim group, bounding the limy and intrusive rocks, although the actual contacts were difficult or impossible to observe. Minor black slates, siltstone and volcanic breccia occur locally above this phyllite; this rock type is found on claim 6 as talus and float (see below). Silurian and Devonian carbonates and quartzite or tuffaceous chert overlie the phyllite and slate and comprise most of the Guano ridge. Thin-to thick-bedded grey limestone outcrops along the length of the claims with thin beds of grey quartzite and orange-weathering grey dolomite. Another area of carbonate rocks occurs 2 or 3 miles (4 or 5 km) northwest of the claims and since the intervening ground is overburden covered, it may be connected to similar rocks on the Guano claims. Bedding dips about ten to thirty degrees to the southwest in both cases. Shales and slate of Mississippian age separate the limestone from the volcanic

sequence. The volcanics are felsic, pale green to buff to maroon, platy to sheared and blocky, and are commonly cut by quartz veins and dikes. Minor tuff, chert, greenstone and serpentine occur with this unit and in certain areas the volcanics have been altered and sheared to phyllite and form orange gossans. In other areas, metamorphism has converted these rocks to chlorite schist cut by high density quartz veining. The syenite itself is typically medium to coarse grained, heterogeneous, buff to pink, massive to blocky, and sheared in some places. Magnetite is a common accessory, as well as purple fluorite and siderite. Areas of fine grained leucocratic syenite (such as that found near the centre of the body) grade locally into pegmatitic syenite containing 1 cm hornblende crystals and large feldspars at the eastern margin of the stock near the contact with the limestone. A 500 - gamma airborne magnetometer anomaly (shown on Government Map 7005G) at the southwest corner of the claims may be related to magnetite in the syenite.

A northwest-trending fault cuts the limestone near the contact with the syenite, as evidenced by local slickensides, muscovite and large blocks of displaced rock. Movement appears to be sinistral. Northeast-trending shears have been noted in the syenite near claim 17.

At the eastern margin of the syenite, where it contacts the limy rocks, an unusual mineral assemblage has developed, containing varying amounts of serpentine, actinolite and tremolite, idocrase, magnetite, and radioactive and rare earth minerals. In field mapping, the term skarn was applied to this assemblage, but work is presently in progress to assess the possibility that a carbonatite exists here, particularly since the high content of rare earth and other elements (Nb, Ce, La, Ba) suggests this association. The radioactive

mineralization, and rocks from both sides of the Guano/Guayes ridge bear this out.

Extensive analysis has been done on specimens from this area, and very high grades of rare earths, thorium and uranium have been determined. The best uranium assay was 1.06 percent U_3O_8 , but unfortunately the uranium content is spotty. One or two boulders of massive dark-purple fluorite were found on claim 17 and a saw-cut through one of these revealed a black mineral, associated with some yellow alteration, as a local source of radioactivity inside it. Most of the highly radioactive specimens collected from this property are difficult to identify petrologically without thin section study but the most common association is with the "greenstone" described above. Detail claim geology is illustrated on Figure U-GU2 (in pocket).

GEOCHEMISTRY AND RADIOMETRICS

About 200 samples were collected in the Guano region on reconnaissance traverses covering the limestone ridge, part of the volcanics, and most of the syenite body. Samples collected during the 1976 field season were comprised of soils, silts, waters, rock chips and whole rocks. Waters were collected in 250 ml plastic bottles and were filtered and acidified with 8M nitric acid the same day to prevent uranium adsorption onto the sides of the sample container. Soils were collected by using a geological pick or mattock to dig to the B & C horizons (wherever possible). Soil and silt samples were placed in pre-numbered kraft paper bags, dried and packaged. After radioactivity measurements, whole rocks were split and stored for reference. Samples were shipped by air freight to Chemex Labs Ltd. in North Vancouver where they were analyzed as follows: rocks were crushed beforehand and then treated as silts and soils; subsequently

all samples were dried at 550°C and screened to -80 mesh, split and weighed, dried twice in 4M nitric acid, picked up in acidified water, fused with a standard sodium fluoride-based flux and assayed in ppm with a G.K. Turner fluorometer. Water samples were pre-concentrated by evaporation and then analyzed by a similar method. Detection limits were 0.5 ppm for soils and rocks and 0.25 ppb for waters.

Outside the claim area, the highest silt, soil and rock assays were 44, 45 and 51 ppm U, respectively, from the centre of the syenite. Most other values were significantly below these. Within the claims, rock specimens returned grades of 0.262 percent, 0.407 percent and 1.06 percent U_3O_8 in three locations, with several assays in the 100 to 200 ppm U range. Two waters draining the main ridge to the east gave highly anomalous values of 14 and 22 ppb U. However, silts and soils within the claims gave less response, even from the more radioactive zone, suggesting that perhaps the uranium is tied up in resistate minerals (at least on the western side of the main ridge) such as zircon.

Nine rock specimens were selected for complete geochemical analysis. The results of this are shown on Table I (see following page), and the nine localities are labelled on Figure U-GU2 as (a) through (i) respectively. Aside from some high uranium values, good grades were returned in rare earths, thorium, columbium and zirconium. No rare earth minerals were recognized in the field. Since specimens that gave high grades in rare earths and columbium were chosen on the basis of radioactivity, there is no assurance that they are exceptional in this regard, and mineralization may exist in the Guano area that will return much higher grades. There is no obvious correlation between uranium, thorium, rare earth and columbium assays, suggesting that each metal is occurring as a separate mineral. Uranium values for all samples are plotted on Figure U-GU1 and U-GU2.

TABLE I
SAMPLE ANALYSES⁽⁴⁾ - GUANO CLAIMS

| IDENTIFICATION: | | | | | | | | | |
|--|-------------------------|----------|---------------------------------------|---------------------------------|----------|--------------------------------|---------------------------------|---------------------|----------------|
| Map Location ⁽²⁾ | (a) | (b) | (c) | (d) | (e) | (f) | (g) | (h) | (i) |
| Sample Number | G642 | G644 | G646 | G650 | G658 | G1927 | G1931 | G11608 | G11609 |
| Traverse | E31 | E32 | O19 | O19 | O17 | E50 | E50 | E50 | E12 |
| Claim Number | 17 | 12 | 8 | 10 | 12 | 14 | 23 | 8 | 8 |
| RADIOACTIVES: | | | | | | | | | |
| Sample Radioactivity ⁽³⁾ | 350/100 | 7000/100 | 2000/100 | 2500/100 | 2000/100 | 3600/100 | 840/100 | 1600/100 | 2000/100 |
| Uranium (1) ⁽⁴⁾ [%U ₃ O ₈] | 142 | 1.06% | 48 | 266 | 0.262% | 156 | 35 | 124 | 147 |
| Thorium (10) [%ThO ₂] | 3160 | | 1.21% | 1.08% | 1.30% | 0.75% | 2040 | 1.06% | 0.93% |
| Potassium (3 %) | 0.5% | 0.7% | 0.7% | 0.2% | 0.5% | 1% | <0.2% | <0.2% | 0.7% |
| RARE EARTHS: (0.1 - 6) | | | | | | | | | |
| Cerium | 15000 | 1000 | 15000 | 10000 | 1500 | 15000 | 10000 | 10000 | 2000 |
| Dysprosium | 150 | 50 | 1500 | 1000 | 300 | 500 | 200 | 1000 | 2000 |
| Erbium | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| Europium | 30 | <20 | 100 | 100 | <20 | 70 | 50 | 50 | 50 |
| Gadolinium | <100 | <100 | 150 | 100 | 100 | 100 | <100 | <100 | 200 |
| Holmium | 50 | < 50 | 200 | 100 | 50 | 70 | < 50 | 150 | 500 |
| Lanthanum (10) | 14000 | 1500 | 10000 | 5000 | 300 | 10000 | 10000 | 10000 | 500 |
| Lutetium | < 20 | < 20 | 20 | < 20 | < 20 | 50 | < 20 | 50 | 50 |
| Neodymium | 2000 | 1000 | 10000 | 10000 | 1500 | 5000 | 3000 | 5000 | 5000 |
| Praseodymium | 500 | < 150 | 2000 | 500 | < 500 | 1000 | 500 | 1500 | 10000 |
| Samarium | 100 | 70 | 200 | 150 | < 100 | < 100 | 100 | 200 | 100 |
| Scandium | < 5 | < 5 | < 5 | 20 | 10 | < 10 | < 5 | < 5 | 70 |
| Terbium | 20 | < 20 | 200 | 100 | 50 | 70 | 20 | 150 | 100 |
| Thulium | 10 | < 10 | 30 | 70 | 15 | 50 | < 10 | 70 | 150 |
| Ytterbium | 150 | 15 | 200 | 500 | 150 | 500 | 70 | 500 | 1000 |
| Yttrium | 100 | 500 | 15000 | 10000 | 2000 | 2000 | 2000 | 7000 | 5000 |
| Total Rare Earths | 3.4% | 0.5% | 5.5% | 3.7% | 0.6% | 3.4% | 2.6% | 3.6% | 2.7% |
| SEMIQUANTITATIVE SPECTROGRAPHIC ANALYSES: ⁽⁵⁾ | | | | | | | | | |
| Arsenic (5) | 50 | | 50 | 50 | | 150 | 50 | 50 | 50 |
| Barium (500) | 500 | | 1000 | 500 | | 7000 | 2000 | 500 | 1000 |
| Beryllium (6) | 15 | | 300 | 100 | | 100 | 700 | 30 | 20 |
| Boron (10) | 30 | | 1000 | 500 | | 700 | 100 | 20 | 20 |
| Calcium (4 %) | 7% | | 10% | 10% | | 7% | 7% | 10% | 5% |
| Chromium (200) | 100 | | 100 | 70 | | 50 | 150 | 50 | 50 |
| Copper (20) | 30 | | 50 | 30 | | 20 | 20 | 50 | 20 |
| Gallium (15) | 100 | | 20 | 50 | | 70 | 100 | 30 | 50 |
| Germanium (2) | <20 | | <20 | <20 | | <20 | <20 | <20 | 50 |
| Iron (2%) | 10% | | 10% | 15% | | 15% | 10% | 15% | 5% |
| Lead (10) | 150 | | 70 | 150 | | 100 | 50 | 70 | 100 |
| Magnesium (2%) | 0.7% | | 5% | 2% | | 7.5% | 1% | 2% | 1.5% |
| Manganese (850) | 200 | | 1000 | 1000 | | 1500 | 2000 | 1500 | 200 |
| Niobium (20) | 5000 | | 500 | 5000 | | 7000 | 10000 | 7000 | 2000 |
| Silver (0.1) | 2 | | <1 | <1 | | <1 | <1 | <1 | <1 |
| Strontium (450) | 300 | | 20 | 20 | | 20 | 200 | 20 | 50 |
| Tin (10) | 100 | | 100 | 50 | | 200 | 150 | 100 | 10 |
| Titanium (4600) | 2000 | | 1500 | 2000 | | 1500 | 700 | 3000 | 2000 |
| Vanadium (100) | 10 | | 100 | 50 | | 20 | 30 | 100 | 200 |
| Zinc (50) | 50 | | 70 | 100 | | 100 | 100 | 100 | 50 |
| Zirconium (160) | >10000 | | 1000 | >10000 | | >10000 | 10000 | >10000 | 5000 |
| Columbium [xCb ₂ O ₅] | 0.58% | | 0.03% | 1.48% | 1.95% | 1.57% | 1.86% | 2.15% | >0.10% |
| REMARKS: | massive purple fluorite | | very fine siliceous grained dark grey | dark grey with 25% pink streaks | | finegrain siliceous grey-green | siliceous veins | dark siliceous vein | siliceous vein |
| | | | | | | | very fine 4000-8000 grained cps | insitu light grey | |

NOTES: (1) All values in ppm unless expressed in percent.

(2) See Figure U-GU2 (in pocket).

(3) Radioactivity given as peak/background, measured in counts per second for hand samples.

(4) Parenthesized numbers following element indicate average abundance in soils.

(5) Not Detected: Antimony, Bismuth, Cadmium, Cobalt, Molybdenum, Nickel, Tantalum, Tellurium.

Scintillometer readings (Scintrex Model BGS-1SL broadband scintillometer with 43 cc NaI(Tl) crystal) varied a great deal over various parts of the region. Typical backgrounds in cps are: syenite - 250 to 400; limestone and dolomite - 40 to 80; phyllite - 70 to 100; and, volcanic - 100 to 200. These values commonly rise to 700, 100, 150 and 500 cps respectively in some areas. Within the skarn itself, siliceous veins in the dark greenstone and limestone were found counting 4000 to 8000 cps over a few centimetres, and radioactive float was found in the vicinity of claims 6 and 8 that counted 2000 to 9000 cps in 5 to 20 kg boulders. One large buried boulder about one metre in size counted well over 10000 cps, but was impossible to sample. The boulder of massive purple fluorite (#G642) mentioned in the previous section was discovered by its associated radioactivity; the weathered surface gave no clue as to its actual composition. Several of the nine specimens listed in Table I were chosen on the basis of high radioactivity with low uranium assays, implying high thorium (and probable associated rare earth and columbium) assays.

Several linear zones of anomalous radioactivity (up to 1300/100 cps) were discovered on claim 7 (see Figure U-GU2). A small amount of metavolcanic outcrop was available for sampling but the best assay returned only 5.5 ppm U. These zones strike about 010° , approximately parallel to the foliation, and are easily traceable under thin overburden. The width is usually one metre or less.

Airborne radiometrics utilized a Scintrex Model GAM-1 spectrometer with a 1853 cc NaI(Tl) crystal (Scintrex model GSA-61) coupled to a Hewlett-Packard model 7155A stripchart recorder. These instruments were mounted in a helicopter (Bell 206A) and lines were flown at about 100 km/hr with 50 to 75 m terrain clearance. Reconnaissance flying used total-count mode, although anomalies were checked for

spectral response on U and Th channels. A one or three-second time constant was used for rapid and smooth chart recording. At the western end of the syenite stock, three anomalies were discovered and groundchecked, but were attributed to good exposure of relatively high-background (600 cps) syenite. Rock specimens returned low uranium values suggesting that local thorium or potassium concentrations may account for the contrasting radiation. The two original airborne radiometric anomalies counted 1600/350 cps with a sharp peak over the skarn zone and 1850/200 cps with a very sharp peak over radioactive float on claim 6.

The spectrometer was used to check the U:Th ratio of most highly radioactive rock samples. The ratio was typically less than 1.5:1, indicating a high proportion of thorium mineralization, as shown by analysis (see Table I). One rock gave a ratio of about 4:1, the highest on the property, and a subsequent assay returned a high uranium value (0.407 percent U_3O_8) with a moderately high thorium value (3000 ppm Th), giving an actual U:Th ratio of only 1.15:1.

CONCLUSION

The geological setting of the Guano mineralization was interpreted as a skarn-altered intrusive contact from field mapping and prospecting, based on the presence of common and uncommon calc-silicate gangue minerals. However, the high content of rare earths and unusual trace elements suggests a carbonatite association. In particular, the anomalous presence of columbium, lanthanum and cerium (and barium to a lesser degree), the proximity to an alkaline igneous "pluton", the magnetic anomaly, and the possible presence of ultramafics are all indicators of carbonatites. Negative indications are the absence of nickel, strontium and vanadium, although carbonatites of the Western Cordillera are

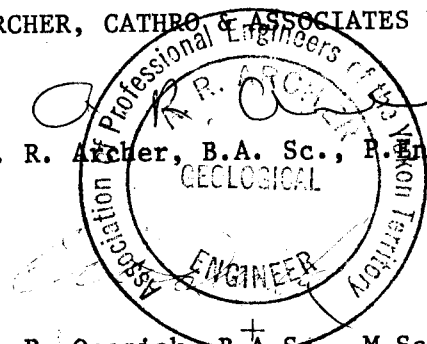
usually deficient in these elements. The uranium mineralization appears to be too patchy to be of economic significance but more prospecting, especially on the Guayas 23-30 claims, is required before final conclusions may be drawn. Specifically, the high anomalous waters on claim 25 are unexplained, and the source of the high grade uranium float has not been determined. In any case, the high columbium assays lend merit to the property as well as the possibility of a significant rare earth deposit belt. The property has some similarities to other columbium/thorium deposits in the Omineca Crystalline Belt of British Columbia. A program of detailed mapping with grid radiometrics, soil and rock sampling is recommended for the claims.

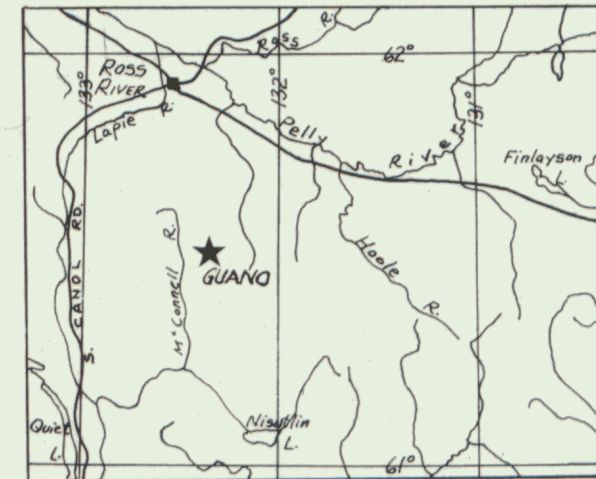
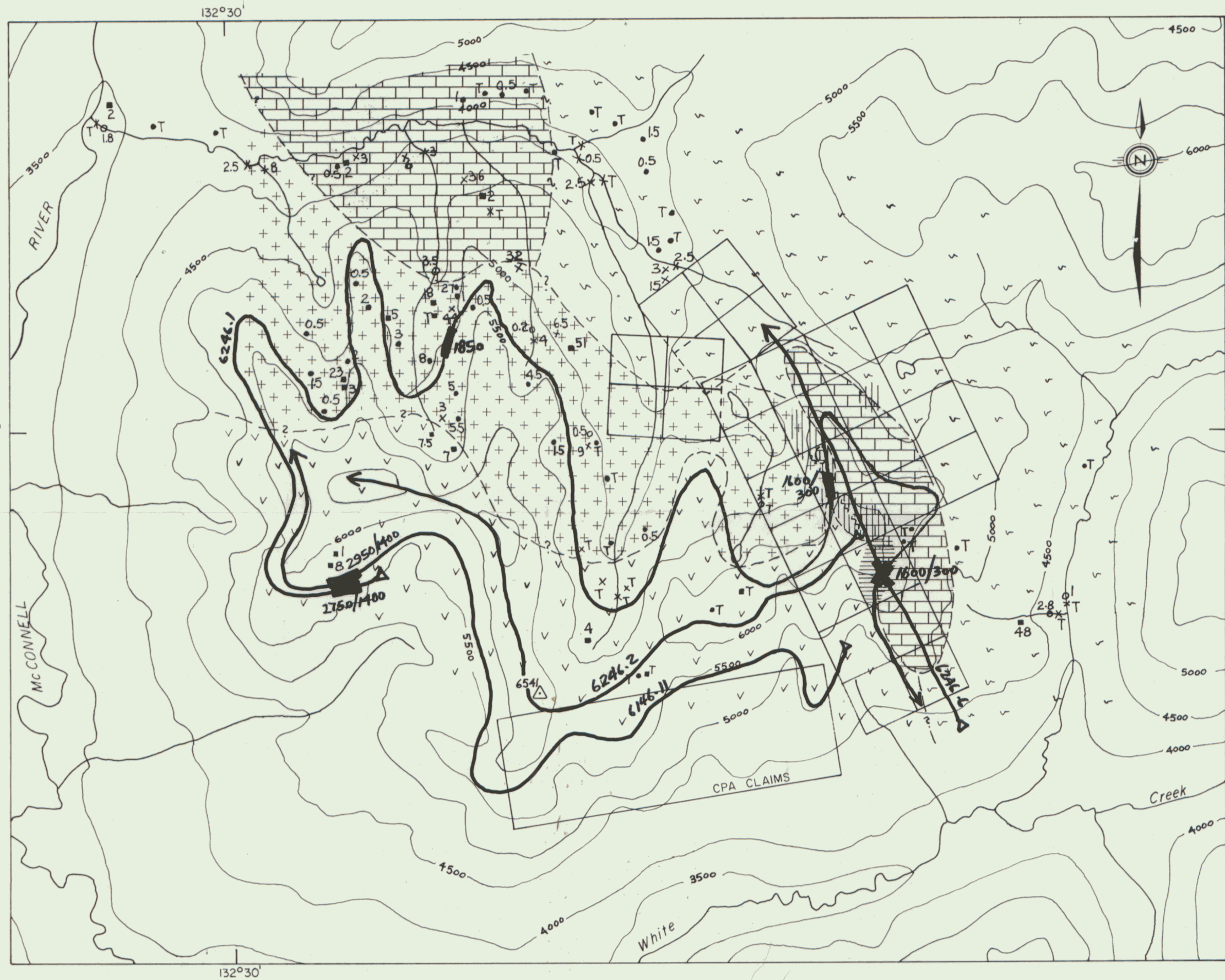
Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES LTD.

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LOCATION MAP 1:2,000,000

LEGEND

- Soil ppm U
- Rock ppm U
- x Silt ppm U
- Water ppb U
- T Trace

---?--- GEOLOGICAL CONTACT (inferred, assumed)

~~~~~ INFERRED FAULT, local slickensides and muscovite schist, assumed sinistral movement

**MISSISSIPPIAN**

Hornblende Syenite: fine to coarse grained, grey-green to pink; minor magnetite, purple fluorite; may be associated with acid volcanics.

Acid Volcanics and Metavolcanics: felsic buff to green, partly metamorphosed or tuffaceous; blocky to platy to sheared; occasionally gossanous; quartz veins, minor chert.

**SILURIAN-DEVONIAN**

Limestone, Dolomite and Quartzite: thin to thick-bedded white limestone and orange-weathering grey dolomite with interbedded grey quartzite.

**CAMBRIAN**

Phyllite, grey to black, lustrous.

shaley to argillitic talus.

skarn? zone, including dark grey-green mineralized serpentinite(?), magnetite, serpentine, idocrase, tremolite, actinolite; siliceous veins.

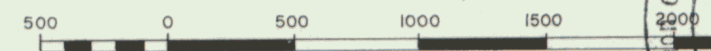
airborne radiometric anomalies (peak/bkgd) and flight lines

Fig. U-GUI

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**GEOCHEMISTRY and GEOLOGY**  
**GUANO AREA**  
 UKON JOINT VENTURE

SCALE 1:30,000



NTS 105F 8/9

