

REPORT ON GEOCHEMISTRY, GEOLOGY
AND RADIOMETRIC SURVEY

NEBULOUS 1-33 CLAIMS

DAWSON MINING DISTRICT
CLAIM SHEET 116B/7

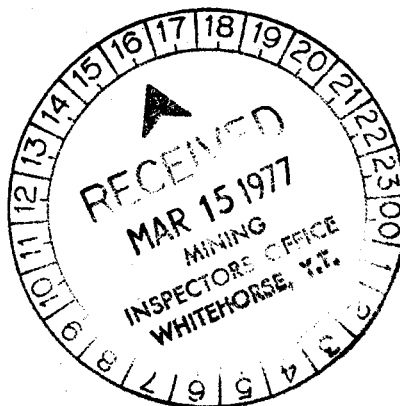
Lat. $64^{\circ}28'$

Long. $138^{\circ}46'$

20 JANUARY 1977

A. R. Archer
E. P. Onasick

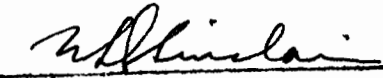
Consulting Engineer
Chief Geologist





This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of


\$ 5325⁰⁰


Resident Geologist or
~~Resident Mining Engineer~~

Considered as representation work under
Section 53 (4) Yukon Quartz Mining Act.



B.R. BAXTER
Supervising Mining Recorder

 Commissioner of Yukon Territory

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FIGURES IN POCKET

Figure U-TS1	Tombstone Area; Radiometrics Scale 1:25,000
Figure U-TS2	Tombstone Area; Geochemistry Scale 1:25,000
Figure U-NE1	Mt. Brenner Stock (Nebulous claims) Radiometrics, Geology and Chip sampling Scale 1:5,000

NEBULOUS PROPERTY

INTRODUCTION

Ukon Joint Venture (Chevron Canada Limited and Kerr-Addison Mines Limited, managed by Archer, Cathro & Associates Limited) discovered the Nebulous occurrences during routine regional reconnaissance by airborne spectrometer in the Tombstone Mountains northeast of Dawson. The original anomaly was found on 16 June 76 on the west facing slope of a ridge on Mt. Brenner (West Showing) and was investigated in more detail the following day after uranium mineralization was found. The UJV crew, comprised of geological engineer Eric P. Onasick, geologist Mike P. Phillips and prospector W. Doug Eaton, investigated the surrounding area and staked two separate claim groups (Nebulous 1-9 and Nebulous 10-15 claims) on 19 June 76. During 14 - 17 July 76, the crew (Onasick and Eaton) returned to the area and prospecting discovered other mineralized zones in the area (including East Showing). On this basis, and from geological considerations and new airborne information the Nebulous 16-29 claims were staked, joining and enlarging the original two groups to form one large, contiguous group. A third examination of the area by the crew on 3 - 4 August 76 resulted in the acquisition of the final four claims in the group Nebulous 30-33), and the property was investigated for the last time on 1 September 76, coincident with a visit by Messrs. H. Wober and E. Dodson of Chevron. Messrs. D. Lowrie and W. Sirola of Kerr-Addison had visited the property on 15 July 76. Supervision during the season was provided by R. J. Cathro and A. R. Archer.

Work by UJV included extensive airborne radiometric reconnaissance and detail surveying, ground traverses with scintillometer to collect geochemical specimens, and chip sampling of the principal anomaly. This work is

illustrated on figures U-NE1, U-TS1 and U-TS2 (in the pocket). Reports concerning UJV-owned claim blocks 'Ting' and 'Sumting', also shown on the latter two figures, are under separate cover.

PROPERTY, LOCATION AND ACCESS

The Nebulous property consists of thirty-three contiguous mineral claims recorded in the Dawson Mining District as follows:

<u>PROPERTY</u>	<u>CLAIM NAME</u>	<u>NUMBER OF CLAIMS</u>	<u>GRANT NUMBERS</u>	<u>EXPIRY DATE</u>
NEBULOUS	Nebulous 1-15	15	YA5089-YA5103	2 July 77
	16-29	14	YA5142-YA5155	23 July 77
	30-33	4	YA5170-YA5173	12 Aug 77

The claims are located at latitude 64°28' north and longitude 138°46' west on claim sheet 116B/7, 30 miles (49 km) northeast of Dawson, in the Cloudy Range between the Chandindu and Blackstone Rivers.

Access to the area was by helicopter from a camp 15 miles (24 km) away, located at Mile 45 (Km 72) of the Dempster Highway, which joins the main Dawson-Whitehorse highway 25 miles (40 km) east of Dawson.

GEOMORPHOLOGY AND GLACIATION

The Tombstone intrusions form the core of the Cloudy and Tombstone Ranges, subdivisions of the Southern Ogilvie Mountains, and are characterized by long, branching, sharp-crested ridges that rise to elevations of more than 7,000 feet (2100 m), with local relief between 3,000-5,000 feet (1000-1600 m), often as sheer cliffs. The area escaped Pleistocene ice-sheet glaciation but was strongly dissected by alpine glaciation. Glacial drift now mantles the lower hillsides

and small stagnating glaciers occupy some north-facing cirques. Till deposits of local derivation as thick as 15 metres are found in the North Klondike Valley. Treeline is about 3,500 feet (1067 m) and vegetation above is mainly grasses, lichens and buckbrush.

REGIONAL GEOLOGY

Middle Cretaceous quartz monzonite stocks intrude Cambrian through Lower Cretaceous strata of argillaceous sediments, volcanics, limestone, phyllitic slate, quartzite and diabase/gabbro, including a xenolith of Permian Limestone (Tahkandit Formation). The rock is well exposed and the Brenner stock outcrops over 8 sq. miles (20 sq. km). The Brenner stock was studied and described in "Geology of the Mount Brenner Stock", in an unpublished UBC Master's Thesis by M. B. Lambert (1963), which shows that the stock is in sharp conformable contact with the host sediments and is concentrically zoned with a porphyritic quartz monzonite core surrounded by successive zones of porphyritic hornblende monzonite, monzonite porphyry, a thin band of pyroxenite, and augite-biotite porphyry.

The stock is mainly bounded by Lower Cretaceous orthoquartzite (Keno Hill quartzite) and diabase which have been deformed by thrust faulting and folding. They have not been noticeably disrupted by the intrusions, which probably crystallized from a magma emplaced in stages (see GSC Bulletin 180). Contacts are steeply dipping, sharp and markedly discordant, truncating stratigraphic and structural features. The rocks are tough and competent, and shears and fractures are not well developed; talus is usually composed of fairly large, angular blocks up to several metres in size with very little

fine fraction. Low density jointing (6 to 8 per metre) is ubiquitous.

Figure U-NE1 illustrates the various phases of the intrusions grading from aplite and pink monzonite porphyry at the centre through progressively less siliceous phases of porphyritic hornblende monzonite, monzonite porphyry, a thin band of hornblende-biotite pyroxenite, and augite-biotite monzonite towards the west and towards the margins. The shaded area on the illustration is referred to as the "crescent". This phase, or at least its inner margin, appears to have some relationship to the pattern of airborne radiometric anomalies discovered in this stock and will be discussed further below. Loosely speaking, the intrusion is of syenitic composition, although Lambert's petrological study has shown that most of the rocks are actually varieties of monzonite. They are typically characterized by a fresh, medium-grained, hypidiomorphic-granular to porphyritic texture, and are composed of feldspar, hornblende or augite, and minor quartz, biotite, olivine and opaques. Phenocrysts in the porphyritic varieties are composed of orthoclase. A pronounced fabric is noticeable in some of the phases although it is missing in others.

RADIOMETRICS AND GEOCHEMISTRY

Extensive airborne radiometric surveying generated several anomalies in the Nebulous area in 1976, shown on Figure U-NE1. The anomalies are associated with the intrusive rocks, and exploration over the surrounding sediments failed to locate any response.

The airborne surveys were carried out using a Scintrex Model GAM-1 spectrometer with 1853 cc NaI(Tl) crystal (Scintrex Model G5A-61), coupled to a Hewlett-Packard model 7155A stripchart recorder. Lines were flown at about 100

km/hr at about 50 to 75 m terrain clearance (where feasible). The spectrometer was set in the total-count mode with three-second time constant for prospecting, although spectral checks were flown over anomalies (i.e. U, Th, K channels).

Typical radiometric response varies from moderate to very strong, and backgrounds of 2000 cps are not uncommon. In addition to uranium, both thorium and potassium contribute significantly to this response; rock assays have confirmed anomalous amounts of thorium. Mass effect from vertical cliffs with their large exposures of radioactive rock also contributed to the strong response.

Airborne radiometric response in the Brenner stock is apparently correlatable with a crescent-shaped monzonite porphyry phase of the intrusion, as illustrated on Figure U-NE1. UJV found the highest radiometric response of the season here, measuring up to 7125/500 cps at the main Nebulous showing. At the same time, other flights delineated a large area of anomalous radiation in this vicinity.

Another group of anomalies (maximum 5250/250 cps) was discovered about 1.8 miles (3 km) to the north, on the east side of Phillips Lakes, and the initial staking protected these areas. When these anomalies were compared with Lambert's zoning, a possible correlation with the crescent of monzonite porphyry was recognized. On this basis, the claim groups were joined and expanded by fourteen more claims to cover the crescent. In retrospect, it now appears that the wider porphyritic hornblende monzonite phase, which parallels the crescent on its concave side, contains the source of the anomalies. However, spectral ratios from the main anomalies indicated a thorium response equal to or greater than the uranium response and assays of most rock specimens from the claims confirmed the high thorium content. This was also reflected in the

relatively high airborne radiometric background over the intrusive rocks, which was usually in the order to 500 to 2500 cps. The background in the vicinity of Mt. Brenner was higher (maximum 3300 cps).

Scintillometer readings (Scintrex broadband model BGS-ISL, with 43 cc NaI(Tl) crystal) indicated a typical background of 800 to 1000 cps in most of the stock, rising to 1200 to 1400 cps in the vicinity of Mt. Brenner and as high as 1600 cps in the rock around the showings. Mineralized float or outcrop raised the count to 8000 to 10000 cps. A small specimen of the yellow secondary mineralization extracted from a fracture counted 1700 cps over background in hand. Radioactivity on the west side of the ridge drops gradually towards Mt. Brenner, but on the east side, a sharp drop in radioactivity is found at the contact between the medium grained hornblende monzonite to the north (1400 cps) and coarse grained monzonite porphyry to the south (700 cps). Sediments outside the Brenner stock at the north end of the claims count only 50 to 70 cps.

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.

Regional geochemistry on the claims is shown on Figure U-TS2. Of particular interest are the good contrasts in water sampling, supported by corresponding silt contrasts. Values between 1.5 and 5.7 ppb U were determined for water draining the anomalous area with the highest assay of 8.3 ppb from a creek just below the West showing. Corresponding silts vary between 22 and 149 ppm, showing that much uranium is leaching and dispersing in ground water.

Airborne anomalies in the Phillips Lakes region did not lead to any mineralized zones and only background values were determined for rock specimens collected in that area.

Minor rosette molybdenum and chalcopyrite were noted in this area. A radiometric response was found in some syenitic dikes at the northern lake, with scintillometer counts as high as 5000 cps. A typical rock specimen assayed 940 ppm Th but only 15 ppm U, suggesting that thorium minerals, possibly thorianite or uranothorite, are the source of the airborne response.

A third occurrence of secondary uranium precipitate in fractures, discovered near the centre of the claim group, yielded an assay of 2.21 percent U_3O_8 , but the occurrence is thought to be isolated and of no economic importance. No analysis was done to determine thorium content.

MINERALIZATION

Uranium mineralization at the Nebulous showings consists of yellow secondary joint coatings and fracture fillings, possibly a result of surface leaching and oxidation of a deeper primary source, although it could represent merely the precipitation of higher than normal background quantities of uranium from the surrounding rocks at the surface.

Mineralization at the West Zone consists of a soft, canary-yellow mineral, and is often associated with a white precipitate, a salmon-pink mineral and traces of malachite. The yellow and white minerals fluoresce moderately to strongly green. A specimen containing about 10 percent yellow oxide assayed 1.1 percent U_3O_8 and 30 ppm Th. The salmon-pink mineral assayed 65 ppm U, similar to unmineralized host rock, which assayed 40 to 80 ppm U. A typical specimen from this zone assayed 156 ppm U, 340 ppm Th, 5 percent K and trace or minor rare earths and columbium. Two chip samples were taken over the Main (West) showing, deliberately omitting mineralized fractures in order to determine uranium content in the host rock (see Figure U-NE1 for location and schematic plot). The analysis shows a range of 12 to 57 ppm U in the fresh monzonite. The joint spacing was typically found to vary between one and four per foot.

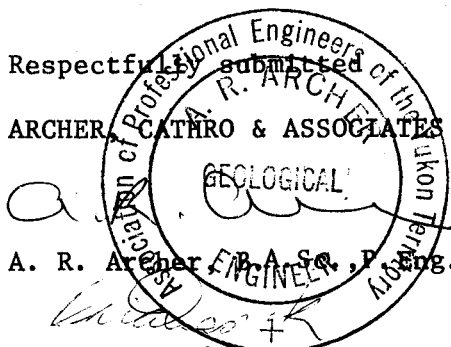
The East Zone, which is probably an extension of the West Zone, was found by ground prospecting with a scintillometer. Mineralization is similar to the West Zone with secondary uranium minerals filling fractures, although fewer mineralized fractures were found. Differences from the West Zone include the absence of the salmon-pink mineral and the presence of high radioactivity associated with mafic phases in outcrop (60 percent dark minerals, mostly hornblende and biotite). An assay of one specimen from this phase returned 0.107 percent U_3O_8 .

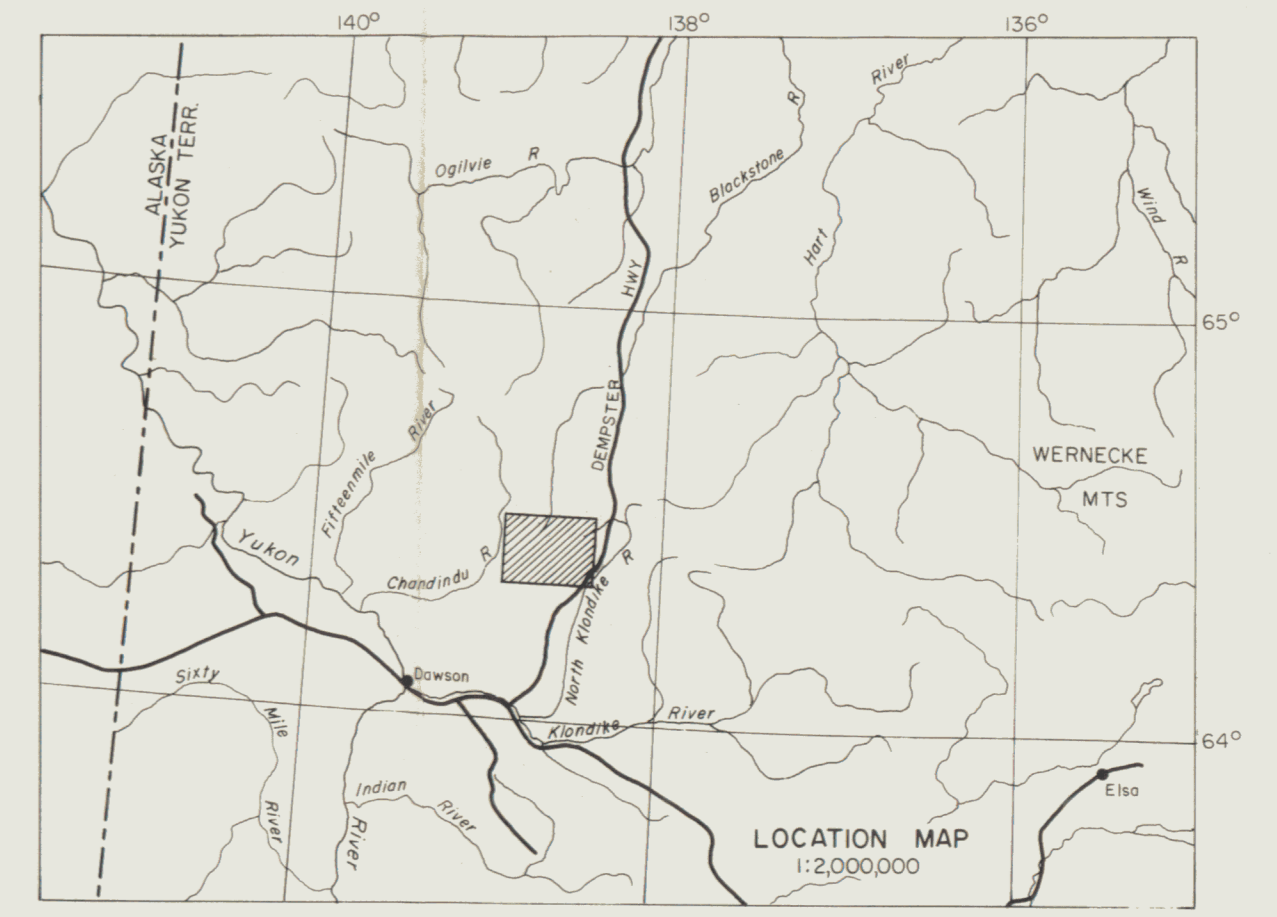
0.58 percent ThO_2 , 2 percent K, 1000 ppm Ce, 300 ppm La, 30 ppm Tb, 15 ppm Sc (anomalous) and 100 ppm Y. Other assays for uranium in the East Zone returned values of 0.267 percent, 0.982 percent, 0.07 percent U_3O_8 or lower. Magnetite and possibly zircon or sphene, and minor malachite and limonite occur as accessories in the monzonite in the East Zone.

CONCLUSION

In summary, the economic potential of the Nebulous area is difficult to assess. Uranium oxides are most abundant in portions of the cliff face which are presently being actively eroded and the evidence suggests that the oxide is so friable and soluble that it is quickly leached away once it is exposed. If this is the case, wallrocks adjacent to the showing that have not been recently subjected to a rock slide could also contain these oxides at shallow depth which would enlarge the Nebulous zone into a fracture network having the dimensions of a porphyry copper deposit and necessitate more prospecting in areas where fresh bedrock is not exposed. Future work must also determine the frequency and thickness of oxide-filled fractures, the depth of the oxide filling, and whether or not pitchblende occurs at depth. Recent erosion has produced terrain conditions at the West Zone so difficult that even travel along the foot of the cliff is difficult. This would be an extremely difficult showing to drill unless the zone is enlarged enough that a more accessible portion is found. The next stage of work should consist of blasting and hand trenching.

Respectfully submitted
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GEOLOGICAL
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LEGEND

- Soil ppm U
- x Silt ppm U
- Rock ppm U or % U₂O₈
- Water ppb U
- T Trace

- UJV claim groups
- - - Other claim groups

- - - Geological contact of syenite with sediments (known, inferred, assumed)
- Pseudotachite tinguaité
- Sedimentary xenoliths within stocks
- ~ Tear faults
- Showings

Fig. U-TS2
 ARCHER, CATHER & ASSOCIATES LTD.
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