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REPORT

ON

THE TAM O'SHANTER PROPERTY

GREENWOOD AREA

BRITISH COLUMBIA

FOR

ONEIDA RESOURCES LTD.

1230 - 800 WEST PENDER STREET

VANCOUVER, B.C.

Vernon, B.C.  
July 23, 1980

By: K.L. Daughtry, P.Eng.

K. L. Daughtry & Associates Ltd.

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## INTRODUCTION

Oneida Resources Ltd., of 1230 - 800 West Pender Street, Vancouver, B.C., owns the Tam O'Shanter claim group near Greenwood in southern British Columbia. The Tam O'Shanter exhibits excellent potential for the discovery of a porphyry copper-molybdenum deposit with significant gold and silver values.

The writer has visited the property on several occasions while exploration work was in progress between the autumn of 1979 and the summer of 1980.

This report, prepared at the request of Mr. George Stewart, officer of Oneida Resources Ltd., describes the property and proposes a phased programme for continued exploration with an estimated budget of \$400,000.00.

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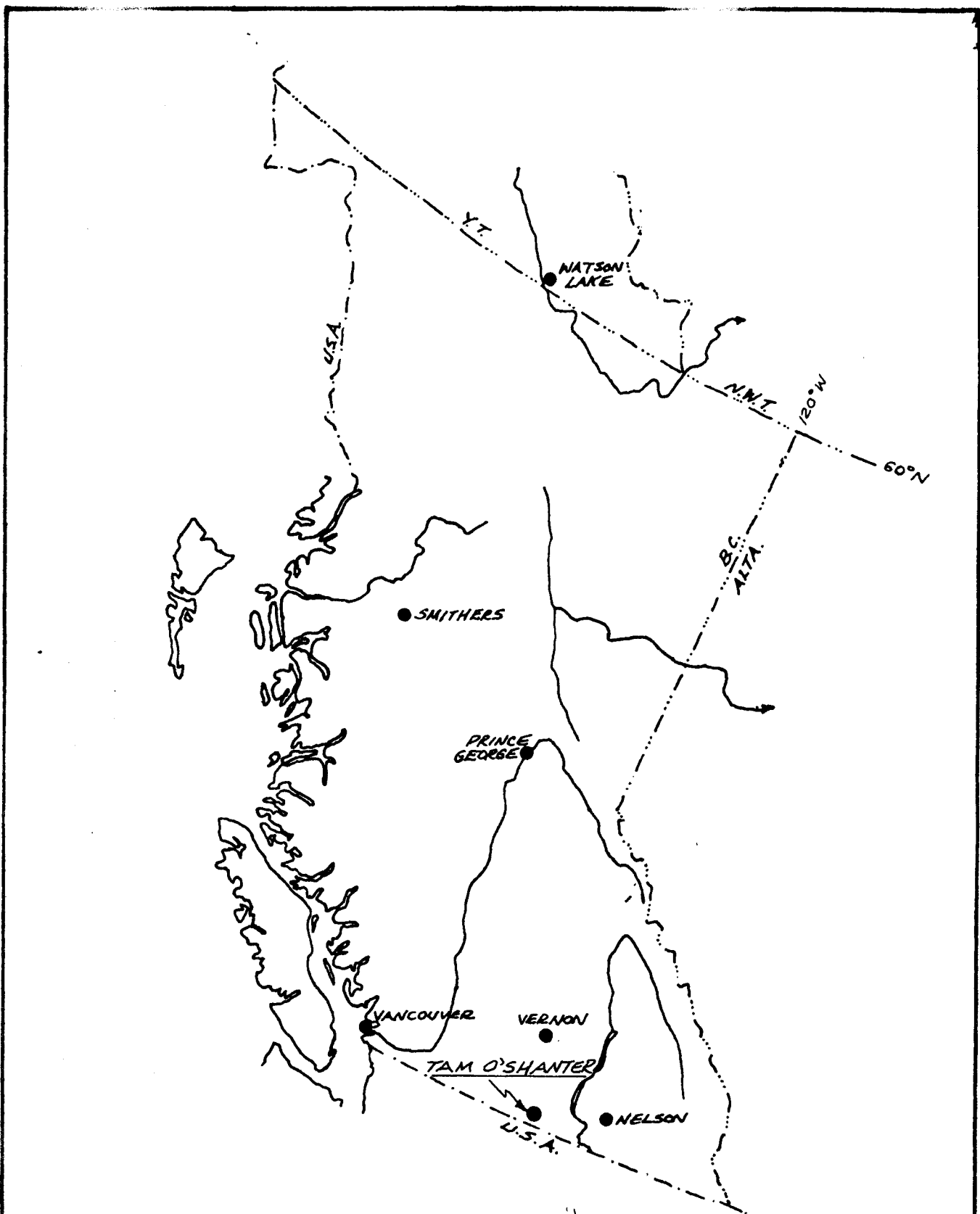
LOCATION, ACCESS, TOPOGRAPHY

The Tam O'Shanter property is between 1.5 and 6 kilometres (1 to 3.5 miles) due west of the town of Greenwood in the Boundary District of southern British Columbia (figure 1). The claim block occupies a southeasterly-trending spur on Ingram Ridge between Motherlode and Jolly Jack Creeks, and the main showings are near the headwaters of Buckhorn Creek (figure 2).

Good road access is available from Greenwood, on the Southern Transprovincial Highway, to the property via the Motherlode Creek road and a network of old bush and mine roads. A four-wheel drive vehicle is necessary on some of these latter roads. Daily scheduled air service is available at the city of Grand Forks, 40 kilometres by highway east of Greenwood.

Topography on the property is typical of the Boundary District. Rounded hills with gentle to moderate slopes are cut by small creek valleys, many of which are fault-controlled. Elevations vary from 850 metres above sea level (2,800 ft. a.s.l.) at the northeast corner of the claim block, on Deadwood Flats, to 1,460 m (4,800 ft.) on the crest of the ridge near the south end of the property.

Most goods and services are available at either Greenwood or Grand Forks, and the Kettle Valley line of the Canadian Pacific Railway serves Greenwood.



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<b>LOCATION MAP</b> <b>TAM O'SHANTER</b> <b>PROPERTY</b>	

JULY, 1980	FIG. NO. 1
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PROPERTY

The Tam O'Shanter property comprises reverted Crown-granted claims held by lease, and located claims totalling 69 claim units, all in the Greenwood Mining Division. The total area held is about 3,400 acres (1,400 hectares).

The reverted Crown-grants are:

<u>Claim Name</u>	<u>Record No.</u>	<u>Lot No.</u>	<u>Expiry Date</u>
Arlington Fr.	1562 (6)	1110	June 11, 1988
Eureka Fr.	2251 (6)	3259	June 5, 1981
Gold Bug No.2	2249 (6)	1718	June 5, 1981
Iva Lenore	162 (11)	1262	November 20, 1987
Little Buffalo Fr.	2250 (6)	1717	June 5, 1981
Montrose Fr.	1644 (7)	2654	July 9, 1988
No.9 Fr.	1562 (6)	882 <sup>s</sup>	June 11, 1988
Salamanca Fr.	1563 (6)	2902	June 11, 1988
Tam O'Shanter	161 (11)	2405	November 20, 1988
Viceroy Fr.	1561 (6)	1722	June 11, 1988

The located claims are:

<u>Claim Name</u>	<u>Record No.</u>	<u>No. Units</u>	<u>Expiry Date</u>
BUCK	1613 (6)	8	June 28, 1988
HOT	1754 (8)	8	August 29, 1988
SHANTER	1176 (7)	16	July 7, 1988
TAM	1616 (6)	6	June 28, 1988
MOTHER	2146 (4)	8	April 29, 1981
LODE	2147 (4)	6	April 29, 1981
WET	2148 (4)	6	April 29, 1981
BUCK Fr.	2149 (4)	1	April 29, 1981
HORN Fr.	2150 (4)	1	April 29, 1981

The owners of record of all claims at the time of writing of this report are either Oneida Resources Ltd., 1230 - 800 West Pender Street, Vancouver, B.C., or George Stewart, Box 130, Greenwood, B.C., agent for Oneida Resources Ltd..

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The current located claims cover some ground originally held by Crown-granted or surveyed claims which have since been cancelled. The following is a list of the old claims which are now wholly or partially covered by the located claims.

<u>Claim Name</u>	<u>Lot No.</u>
Badger	2377
Bengal	2375
Blue Bell	1108
Blue Bell Fr.	1515
Boulder Fr.	2318
Bristol	2376
Burns	2911
Burns Fr.	1281
Columbia	886
Copper Trust Fr.	1278
Deadwood	1962
Dixie	2589
Dourango (Durango)	1948
Elk Fr.	2320
Emerald	1263
Golden Fleece	1529
Herbert Spencer	1571
Iron Top	1109
Iron Pyrites	1390
Keystone	2432
Laccoon (Laocoon)	2147 (1386)
Magnetite Fr.	1424 <sup>s</sup>
New York	2434
Oregon	1719
Phoenix	1716
Picadilly	1277
Plot	1720
Scranton Fr.	1279
Teutonia Fr.	2392
Winslow	2433
York Fr.	2148 (1385)

HISTORYBoundary District

In 1891 prospectors discovered most of the important deposits of the Boundary district, including those of the Deadwood and Phoenix Camps. By 1913, the district had become one of the major copper-producing areas of the world, and when production ceased in 1919, about 22 million tons of ore had been mined with an average grade of 1.5% copper, 0.03 oz/ton gold, and 0.5 oz/ton silver. The major mines were the Motherlode-Sunset, about 800 metres north, and the Phoenix Camp, 7 km east, respectively, of the Tam O'Shanter property. Other important deposits were the Oro Denoro and B.C. mines in the Summit Camp, 4 km northeast of Phoenix. All of these mines are strata-bound pyrite-hematite-chalcopyrite-magnetite deposits in impure limestones overlying a pyroclastic unit.

The Providence mine, 3 km northeast of the Tam O'Shanter, was a much smaller but high grade operation which produced, in this period, 11,500 tons of ore from a Tertiary quartz vein averaging 119 oz/ton silver and 0.5 oz/ton gold.

During the 1930's, the Jewel mine at Jewel Lake, 10 km north of Greenwood, produced 66,500 tons of ore from a Tertiary quartz vein which averaged 0.32 oz/ton gold and 2.0 oz/ton silver.

Production at the Phoenix mines resumed in 1957 and continued until the mid 1970's. The total production from Phoenix to date is about 30 million tons averaging 0.85% copper, 0.033 oz/ton gold and 0.20 oz/ton silver. Shipments resumed from the Motherlode in 1957 and continued intermittently to 1962. A total of 4.4 million tons of ore averaging 0.9% copper, 0.04 oz/ton gold



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and 0.16 oz/ton silver has been mined.

The Greyhound deposit, adjoining the Tam O'Shanter property at Deadwood Flats, produced during 1970 and reported reserves of 400,000 tons averaging 0.8% copper.

At present, development of several deposits in the district is underway, including the Lexington property south of Phoenix, the Skomac property 4 km south of the Tam O'Shanter, and the Dentonia mine at Jewel Lake.

#### Tam O'Shanter Property

Prospectors first staked many of the claims in the area of what is now the Tam O'Shanter property in 1891. The Annual Reports of the British Columbia Department of Mines first refer to the Buckhorn, Columbia and Iva Lenore in 1894, the Boulder Fr in 1896, the Cleveland, Golconda, Lacon (Laocoon) and York Fr in 1897, and the Arlington Fr, Bee and Ladoga in 1899. Apparently, most of the showings on the present property were known by 1907.

By 1897, an inclined shaft had been sunk on a high-grade copper zone on the Iva Lenore which carried attractive gold and silver values. A similar zone was being explored on the Golconda property, immediately southeast of the present Tam O'Shanter claim block. In 1899 some copper-gold ore was shipped from the Buckhorn, a claim adjoining the present property on the east. By 1907, many of the showings were being actively explored, including the Tam O'Shanter, Columbia, Iva Lenore, Golden Fleece, Bengal, Moreen, Magnetite Fr and others.

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In 1921-22, considerable underground exploration was carried out on the Tam O'Shanter claim by A.J. Morrison and Dan McGillis. Over 600 feet of underground workings were driven to explore high grade silver-gold-copper mineralization in a quartz-carbonate vein.

Apparently much of the exploration work on the property went unreported in the past. Many underground workings, in some cases totalling several hundred feet, occur in various parts of the claim block. Shafts, tunnels, pits and trenches are numerous on the old Golden Fleece, Columbia, Bengal, Tam O'Shanter, Emerald, Iva Lenore, Salamanca, Blue Bell, Iron Top, and Burns claims.

From the 1920's to the mid-1950's little exploration work was recorded. In 1955-56 Salmo Prince Mines Ltd. and Salamet Mines Ltd. conducted geophysical surveys and diamond drilled 19,000 feet on the Greyhound, Buckhorn, and surrounding area, including the northeast part of the Tam O'Shanter property.

The next phase of exploration activity commenced in 1964, when Silver Dome Mines Ltd. began an extensive programme on a large claim block which included the present Iva Lenore and Tam O'Shanter zones. Ten miles of road and 13,000 feet of stripping were bulldozed, and over 6,000 feet of diamond drilling were completed. A grid was established and magnetometer and geological surveys conducted.

In 1965, Crown Silver Development Co. Ltd. followed-up the 1964 work by constructing 8 miles of new road, diamond drilling, stripping, and conducting a geochemical silt survey. The following year, Utah Construction & Mining Co. optioned the property and carried out detailed geological, geochemical, magnetic and induced polarization surveys, followed by over 2,000 feet of diamond

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drilling and further bulldozer stripping, In 1967, Utah drilled one 350 foot hole and carried out geological mapping.

San Jacinto Explorations carried out induced polarization and magnetic surveys on the Buckhorn in 1966, and in 1967 diamond drilled 8 holes. In 1968, the same company drilled 4 holes and carried out bulldozer trenching on the Buckhorn and Moreen Fr.

Sun Oil Co. optioned the San Jacinto Property in 1972 and completed 2 diamond drill and 10 percussion drill holes on the Tam O'Shanter and Buckhorn zones.

In 1972 Phelps Dodge Corp. carried out detailed geological mapping on the Toney and Vendella showings immediately east of the property.

Mapletree Exploration Corp. optioned the eastern part of the property, as well as the Buckhorn, Toney and Vendella, in 1973, and completed an excellent compilation of previous work, conducted detailed geological mapping, and percussion drilled 12 holes. In the same year, Mascot Mines and Petroleum Ltd. optioned the western part of the property, and drilled 4 percussion holes on the Iva Lenore. In 1974, Mascot carried out magnetometer and geochemical soil surveys and drilled 17 percussion holes on the Iva Lenore, Tam O'Shanter and adjoining Gotcha claims, and completed further geological

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mapping, a magnetometer survey and 8 percussion holes on the Moreen Fr and Buckhorn.

From 1975 to 1978, George Stewart of Oneida Resources Ltd. made detailed geological studies of alteration and fracture patterns in an effort to delineate a porphyry copper target. In 1979, Oneida carried out soil sampling and drilled three diamond drill holes on the Golden Fleece zone. In 1979-80, the writer visited the property a number of times during the diamond drilling and subsequent trenching programmes, and completed an exhaustive review and compilation of previous work.

REGIONAL GEOLOGY

The geological history of the Greenwood area is complex. At least three distinct sequences of sedimentary and volcanic rocks have undergone varying degrees of deformation, metamorphism and faulting. Numerous plutonic rocks, ranging in composition from ultramafic to felsic, have intruded all but the most recent Tertiary volcanic rocks. Large areas are covered by overburden and outcrops are generally not abundant. Consequently, the geology of the district has been difficult to unravel and no comprehensive published work yet exists. The following summary is based upon information from the reports and maps listed under "REFERENCES" and upon several days of regional traverses by the writer in 1979 and 1980.

The oldest rocks are a sequence of gneiss, schist, and quartzite of Palaeozoic(?) age similar to the Shuswap metamorphic rocks of the Okanagan region. These rocks are more deformed and more intensely metamorphosed than any others in the Greenwood area and appear to form a basement complex.

Unconformably overlying the basement rocks is a sequence of Late Palaeozoic or Early Mesozoic volcanic and sedimentary rocks, including basaltic and andesitic flows, rhyolite breccias and tuffs, chert, limestone, argillite, siltstone and conglomerate. These rocks have been folded and metamorphosed to greenschist facies, but in general are much less altered than those of the basement complex. This sequence of rocks hosts all of the important copper-gold-silver sulphide deposits of the Greenwood area.

All of the above rocks are intruded by a baffling array of igneous rocks. Elongate serpentized peridotite bodies, which may be intruded along fault planes, appear to be the oldest intrusive rocks. Large batholiths

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and smaller stocks of granodiorite, quartz diorite, diorite, quartz monzonite and granite are related to the Nelson batholithic complex of Jurassic/Cretaceous age. Several bodies of quartz porphyry and quartz-feldspar porphyry are of Cretaceous or Early Tertiary age.

The Eocene Kettle River formation unconformably overlies all the above rocks. This unit is a sequence of dacitic tuff and arkose with local shale and conglomerate. The thickness and composition of this unit varies markedly from place to place indicating deposition on a terrain with considerable topographic relief. Overlying the Kettle River formation are Eocene to Oligocene dacite, latite, andesite and minor tuff. Contemporaneous dykes, plugs and stocks of Coryell syenite, diorite, quartz monzonite, pulaskite and gabbro intrude all rocks.

Tertiary block faulting related to large northerly-trending grabens has displaced all rocks. Vertical displacements of several thousand feet on some of these faults has complicated the problems of mapping and correlation of the older folded volcanic and sedimentary rocks. A number of low-angle normal faults, possibly gravity slides, have been identified. These faults are probably contemporaneous with the block faulting and are related to the settling of the grabens.

MINERAL DEPOSITS

The mineral deposits of the Greenwood area can be crudely grouped into four types:

1. Stratabound pyrite-chalcopyrite deposits with important gold-silver values in impure limestones and limy argillites of the Late Palaeozoic/Early Mesozoic volcanic sedimentary sequence. This type includes all the major mines of the area and several smaller deposits (Phoenix, Motherlode, Greyhound, Oro Denoro, Emma, B.C.).
2. Fracture-controlled copper-silver-gold mineralization related to alkaline porphyry intrusive rocks of Mesozoic age, possibly correlative with the Copper Mountain deposits near Princeton, B.C. (Lexington, Sappho).
3. Tertiary quartz veins containing gold-silver-copper mineralization, including the Dentonia, Providence and Skylark deposits.
4. Tertiary porphyry copper-molybdenum mineralization. The Tam O'Shanter property is the only known occurrence of this type in the area. Amax is currently developing a major deposit of this type in Ferry County, Washington State, about 115 km south of the Greenwood area.

PROPERTY GEOLOGY

On the Tam O'Shanter property, folded Late Palaeozoic/Early Mesozoic andesite, argillite, siltstone, chert and limestone are intruded by Mesozoic diorite and quartz-diorite. These rocks are unconformably overlain by Eocene Kettle River formation tuff, arkose and dacite, which are in turn overlain by massive flows of andesite and basalt. Pulaskite dykes abound and appear to cut all rock types (figure 3).

Older Layered Rocks:

The Late Palaeozoic/Early Mesozoic volcanic and sedimentary rocks include chert, tuff, argillite, siltstone, andesite, and minor skarn. Both massive and bedded chert occur: the bedded type appears to be of sedimentary or volcanic-sedimentary origin, but the massive white "chert" is thought by the writer to be a product of intense hydrothermal silicification. This high-silica rock is commonly pyritic and rusty-weathering and appears to occur in discordant relationship to several other layered units, including andesite, argillite and siltstone. Previous workers mapped lithologic varieties including silicified andesite, quartzite, chloritic chert and massive chert which may be progressively more altered equivalents of the original sedimentary and volcanic rocks.

Mesozoic Intrusive Rocks:

The Deadwood diorite is an elongate body of medium to dark greenish-grey fine-grained intermediate rock which underlies the east-central part of the claim block and trends easterly from the Tam O'Shanter claim to the adjoining Buckhorn ground and easterly to Deadwood Flats. The diorite and



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country rock have been intensely fractured, altered and mineralized with pyrite and chalcopyrite over large areas.

Within the diorite are at least three zones of quartz-diorite which may be slightly younger plutons. The quartz diorite is a medium to light-greenish grey medium-grained rock containing more than 10% quartz. In places this rock appears to be a coarser-grained equivalent of the diorite, but in others it is lighter-coloured and contains abundant quartz. Three zones or plugs of quartz diorite have been identified within the main Deadwood diorite stock: The Buckhorn zone is immediately east of the property; the Tam O'Shanter quartz-diorite occurs at the west end of the Deadwood stock where it is truncated by a northerly-trending Late Tertiary normal fault; and the Iva Lenore zone is in the southwestern portion of the Deadwood stock where it is in contact with highly altered country rock. In all three zones the degree of fracturing, mineralization and hydrothermal alteration is much greater than in the main diorite body. A fourth zone or plug, the Golden Fleece quartz diorite, occurs southwest of the Iva Lenore zone and is seen only in a few small outcrops and in the Golden Fleece tunnel. It appears to be the apex of a stock which is just being unroofed by erosion. The rock is a leucocratic, altered, light grey to buff medium-grained quartz diorite similar in texture and mineralogy to the other zones but more intensely altered.

#### Tertiary Layered Rocks:

All of the above rocks are unconformably overlain by Tertiary sedimentary and volcanic rocks which cover the entire western half of the property. The basal unit is a thick sequence of tuff, shale, mudstone, and arkose. In

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places, well-bedded shaly beds are seen in outcrop and are nearly flat-lying or dipping at low angles to the west.

In Oneida's drill holes 79-1 and 79-2, the Kettle River rocks become progressively more altered with depth. However, at the Tam O'Shanter showings, the intensely altered and mineralized Tam O'Shanter quartz diorite is in fault contact with unaltered and unmineralized Kettle River sediments.

The Kettle River formation is overlain on the ridge on the western part of the property by massive andesite and basalt flows. No mineralization or hydrothermal alteration has been seen in these rocks, but G. Stewart has noted quartz veining in basalt west of the property.

#### Intrusive Rocks

A thick (100 m) section of grey dacitic feldspar porphyry was intersected in drill hole 79-2 within the Kettle River formation. This rock may be a thick flow, but appears more like an intrusion. The most intense hydrothermal alteration yet seen on the property occurs in and near this rock unit and the writer thinks that the porphyry may be a dyke or apophysis from a post-Kettle River intrusion, as yet unseen.

Dykes of brown to red pulaskite are common, and one small outcrop of brecciated Coryell-type granitic rock has been mapped near the Golden Fleece zone.

#### Structure

The older layered rocks trend northwesterly across the eastern part of the property and are tightly folded. Dips vary from 35° to 65°.

Tertiary block faulting has had a profound effect upon the distribution of lithologic units and mineralized zones. The Deadwood diorite stock has been truncated at its western end by a northerly-trending fault which dips steeply to the west. The westerly side of the fault is the downthrown block, and the mineralized diorite is in contact with barren Kettle River sediments, indicating a post-mineralization age to the fault. The eastern end of the Deadwood diorite appears to be in fault contact with the Greenwood granodiorite stock in Deadwood Flats.

The southern contact of the stock is thought by the writer to be a low-angle southerly-dipping gravity fault. The trace of the diorite/country rock contact is curvilinear and follows the topography. Previous mapping has noted several outcrops of faulted, sheared and shattered rocks near this contact. The upper fault block apparently slid southward, suggesting that the mineralized quartz diorite of the Golden Fleece zone may be correlative with the Tam O'Shanter zone to the north. If this is so, the Tam O'Shanter, Iva Lenore and Golden Fleece zones, as well as the mineralization intersected in the deep hole 79-2 drilled by Oneida to the west of the Tam O'Shanter fault, may all be faulted sections of one original mineralized system.

Several other faults, both pre- and post-mineralization, occur throughout the area. The linear north-trending at the head of Buckhorn Creek appears to be a strong pre-mineralization fault in which intense silicification has been concentrated.

### MINERALIZATION & ALTERATION

Exploration work to date on the Tam O'Shanter property has focused on three types of mineralization:

1. Stratabound pyrite-hematite-chalcopyrite-magnetite mineralization in highly altered Palaeozoic/Mesozoic argillaceous limestone and limy andesite. This type of ore is predominant at the major deposits of the adjoining Deadwood Camp, including the Motherlode, Sunset and Greyhound mines. Similar but sub-economic mineralization occurs on the Buckhorn, Vendella, Golden Fleece and Golconda. This type of mineralization is not a high priority target on the Tam O'Shanter property.
2. Quartz veins, presumably of Tertiary age, containing high grade silver-gold-copper values occur on the Tam O'Shanter and Golden Fleece claims. This type of occurrence has been productive at several other properties in the district (Dentonia, Providence) and some consideration should be given to an evaluation of the known veins on the property.
3. The major focus of exploration of the property for the past 16 years has been the widespread zones of low-grade porphyry-copper and copper-molybdenum mineralization in the Tam O'Shanter, Iva Lenore, Buckhorn and Golden Fleece zones. Pyrite and chalcopyrite, with occasional native copper and molybdenite, occur as disseminations, along fractures and shear zones, and in quartz veins and veinlets in the Deadwood diorite, Buckhorn, Tam O'Shanter and Golden Fleece quartz diorites, in the older sedimentary and volcanic country rock, and in the lowermost part of the Eocene Kettle River

pyroclastic and sedimentary unit. Secondary malachite is ubiquitous. In some drill holes, important gold and silver values have been encountered.

Copper mineralization is concentrated in areas of more intense fracturing and hydrothermal alteration. Weak propylitic alteration is widespread in the Deadwood diorite, with biotite and hornblende being chloritized. Propylitic alteration and fracturing of quartz diorites is more intense in areas of higher grade copper mineralization on the Iva Lenore and Tam O'Shanter zones, with montmorillonite replacing feldspar, mafic minerals entirely chloritized, and abundant pyrite, hematite, carbonate and magnetite. The quartz content of the intrusive rocks is greater in the mineralized zones, and the older country rocks are hornfelsed and silicified.

In the Golden Fleece zone, the intrusive rock is a bleached quartz diorite which has undergone intense argillic hydrothermal alteration. Chalcopyrite and molybdenite occur with abundant pyrite in quartz veins and veinlets, silicified breccia, and as disseminations in kaolinized quartz diorite.

A large zone of intense silicification and pyritization, with coincident Induced Polarization anomalies, appears to be distributed in a convex arcuate pattern to the north, northeast and east of the Golden Fleece zone. The silicification has resulted in a replacement, by massive, aphanitic to fine-grained silica, of various Palaeozoic/Mesozoic and Eocene rock types. (The diorite and quartz diorite have not been altered in this way).

The highest grade copper mineralization discovered to date is along the truncated western edge of the Tam O'Shanter zone, the southern Iva Lenore zone and the Golden Fleece zone. Intersections of up to 300 feet of mineralization averaging from 0.2 to 0.3% copper have been drilled in several areas.

The highest grade silver and molybdenite mineralization discovered to date on the property was encountered in Oneida Resources vertical diamond drill hole 79-2 on the Golden Fleece zone. Between depths of 560 and 610 feet, the 50-foot interval averaged 0.3% copper, 0.02% molybdenum, 0.1 oz/ton silver and 0.002 oz/ton gold. A second interval from 930 to 950 feet including galena-bearing quartz veins, averaged 2.0 oz/ton silver and .007 oz/ton gold across 20 feet. (All values from geochemical analyses of drill core.)

The writer believes that the mineralized zones explored to date are peripheral to a porphyry copper-molybdenum system genetically related to a Tertiary felsic pluton which has not yet been seen. The dacitic feldspar porphyry unit intersected between 323 and 650 feet in 79-2 hole may be an apophysis of such a pluton .

The arcuate zone of silicification and pyritization, and the increasing intensity of hydrothermal alteration to the south and west of the Tam O'Shanter, Iva Lenore and Golden Fleece zones, suggest that the centre of mineralization and alteration lies in that direction. Complex pre- and post-mineralization faulting has apparently discrete mineralized zones.

Exploration should be directed toward the delineation of mineral-

ization and alteration related to the main porphyry mineralizing event by geological studies, trenching and drilling. Geochemical and geophysical surveys should prove valuable toward this end.

The work by Stewart and Oneida to date has been most productive. It now appears that a large Tertiary porphyry copper-molybdenum system has been dismembered by Tertiary block faulting. The mineralization discovered to date is believed by the writer to be peripheral to the main mineralized zone, and this concept is supported by the evidence seen in drill hole 79-2, which passed vertically from barren Tertiary rocks, through mineralized and altered Tertiary units and Mesozoic intrusive rocks, into barren Mesozoic intrusive rock.

The main mineralized zone appears to lie either on the west, down-dropped side of the Tam O'Shanter fault or at depth beneath, or southwest of the Golden Fleece zone.

SUMMARY OF PREVIOUS WORK

To date, at least 37,000 feet of diamond and percussion drilling have been completed on and near the Tam O' Shanter property. In the 1950's, exploration was directed toward discovery of Motherlode-type sulphide deposits in the north-eastern corner of the property and adjoining areas. From 1964 to 1974, major exploration programmes tested porphyry-copper mineralization of the Iva Lenore, Tam O'Shanter and Buckhorn zones. Although geological mapping, soil sampling, magnetic and induced polarization surveys were conducted, there is no record of any geological or geochemical surveys being carried out specifically to determine alteration or fracture patterns. The major exploration approach was bulldozer trenching and stripping, followed by drilling.

The above work delineated several zones of widespread mineralization with average grades between 0.1 and 0.3% copper. The highest grade mineralization appeared to be related to areas of more intense alteration and fracturing near the margins of the Deadwood diorite stock.

From 1974 to 1979, Mr. George Stewart of Greenwood carried out geological mapping of variations in hydrothermal alteration of the intrusive rocks. He concluded that the intensity of alteration increased to the south and west part of the stock, where it was overlain by Tertiary volcanic and sedimentary rocks.

In 1979 and 1980, Oneida Resources Ltd. acquired the property and conducted a geochemical soil survey of the Golden Fleece zone to the southwest of all previous exploration. Anomalous values were found over a large area underlain by Golden Fleece diorite and surrounding country rock. Anomalous molybdenum values also occur west of the Tam O'Shanter fault near the old Bengal shaft in an area underlain by the Tertiary Kettle River formation.

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Three holes were diamond drilled by Oneida in the autumn of 1979. The first, 79-1, was drilled westerly at  $-45^{\circ}$  under the Bengal shaft. The drill target was the mineralized pluton west of the Tam O'Shanter. This hole intersected progressively more altered tuffs and sediments until squeezing forced abandonment at a depth of 481 feet. Silicification, pyritization and kaolinization become more intense with depth in the hole.

The second hole, 79-2, was drilled vertically from the same set-up to a depth of 1040 feet. The upper 300 feet were similar to 79-1. From 300 to 323 feet a zone of brecciated tuff, shale, altered and silicified rock, and dacitic porphyry was intersected. From 323 to 621 feet the hole cut a dacitic feldspar porphyry dyke or small plug. In places the rock is fractured and strongly altered, with numerous quartz veinlets. Alteration includes silicification, pyritization, potassium-feldspar "flooding" and argillization. Chalcopyrite occurs in quartz veinlets and disseminated in altered rock. From 651 to 707 is a section of argillized pyritic rock, followed by 15 feet of high-silica rock similar to the zone of heavy silicification seen on surface. From 722 to 851 the hole cut intensely altered, silicified and brecciated rock, presumably altered Kettle River formation. From 851 to the end of the hole was a section of granodiorite or quartz diorite similar to that on the Golden Fleece and Tam O'Shanter zones. This intrusive rock becomes progressively less altered down the hole, from strong argillization and K-feldspar veining with abundant disseminated sulphides to relatively fresh rock at the end of the hole.

Copper values vary from trace in the upper 300 feet of the hole, 0.01 to 0.1% in the upper part of the dacite dyke, 0.07 to 0.53% in the intensely altered central part of the dyke, 0.01 to 0.24 in the altered rock below the

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dyke, and 0.05 to 0.27% in the granodiorite. The intensity of hydrothermal alteration and fracturing has a similar distribution, being weakest at the top and bottom of the hole, and strongest in the areas of the dacite dyke and the upper contact of the granodiorite. The silver, molybdenum and gold values generally follow the same pattern; the highest silver values, however, are at a depth of 930 to 950 feet, where successive 10-foot intervals averaged 0.96 and 3.1 oz/ton respectively.

A third hole, 79-3, was drilled 639 feet easterly at  $-45^{\circ}$  under the most southerly Golden Fleece surface workings. The entire hole was in the older metamorphosed volcanic and sedimentary rocks and failed to intersect any intrusive body. Quartz veins were intersected which were mineralized with pyrite, galena, chalcopyrite and molybdenite, similar to veins seen in surface cuts. Hydrothermal alteration, comprising silicification, pyritization and introduction of epidote, carbonate and gypsum is widespread. In the spring of 1980, following a compilation of previous work by G. Stewart and the writer during the winter, a programme of backhoe trenching was carried out on the Tam O'Shanter and Golden Fleece zones. On the Tam O'Shanter, the north-trending post-mineralization fault was exposed which truncated the west end of the mineralized intrusive stock. Unaltered and unmineralized Kettle River sediments are in contact with heavily mineralized quartz diorite.

Near the Bengal shaft on the Golden Fleece zone, a long trench exposed a wide section of intensely silicified and pyritized Kettle River sediments. Further south, near the collar of 79-3, trenching exposed a wide section of intensely silicified and heavily pyritized rock which may be a healed pre-mineralization fault zone.

The old Golden Fleece adit and shaft were also cleared out. In the adit,

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several hundred feet of bleached, altered and mineralized quartz diorite are exposed. The rock is cut by a stockwork of quartz veins and veinlets mineralized with pyrite, chalcopyrite and minor molybdenite. This rock is not seen on surface so it is assumed that the upper contact of the stock is nearby. In the tunnel above the adit, a quartz vein up to 0.5 m wide is truncated by a fault. The vein is heavily mineralized with pyrite, chalcopyrite and molybdenite, and cuts white high-silica rock.

CONCLUSIONS & RECOMMENDATIONS

Widespread disseminated and fracture-controlled porphyry copper-molybdenum mineralization occurs on the Tam O'Shanter property of Oneida Resources Ltd. near Greenwood, B.C. Recent exploration work by Mr. George Stewart of Oneida, consisting of geological mapping, soil sampling, backhoe trenching and diamond drilling, has indicated that a major porphyry-type mineralized zone occurs to the south and west of areas tested by previous exploration. The writer believes that only a peripheral part of the porphyry system has been explored to date, and that post-mineralization faulting has dismembered the upper part of the system, resulting in the occurrence of several apparently discrete mineralized zones at surface.

The presence of low-grade copper-molybdenum mineralization over widths of up to 300 feet, and the evidence of a large arcuate zone of intense hydrothermal alteration in the propylite and argillic facies, indicate that potential exists for discovery of a large porphyry copper-molybdenum deposit on the Tam O'Shanter property. Also, relatively high silver values have been intersected by drilling (up to 3 oz/ton silver over 10 feet) which are apparently related to the same mineralizing event as the copper and molybdenum.

Further exploration is certainly warranted and a three-phase programme is recommended. Initially, the grid on the property should be expanded to the south and west to cover the new target area. Geological mapping of the new area, and some re-mapping of the Tam O'Shanter, Iva Lenore and Golden Fleece zones should be conducted with emphasis on hydrothermal alteration, fracture patterns hopefully will enable a more effective delineation of drill targets. Induced Polarization and geochemical soil and rock surveys should be conducted as an aid to the geological interpretation. Outcrop is relatively scarce on

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the property, so further backhoe trenching will be necessary to investigate target areas prior to drilling.

The second phase of exploration should consist of several widely spaced drill holes to test the extent and degree of mineralization in the porphyry system. It is anticipated that 5000 feet of drilling will be required in this phase. Logging of the holes should concentrate upon defining patterns and distribution of mineralization, alteration and fracturing, and upon delineation of the Tertiary pluton which presumably is the source of the porphyry event.

Contingent upon encouraging results from the above work, a third phase of exploration is recommended which should entail more detailed exploration drilling of mineralized zones. It is anticipated that at least 10,000 feet of drilling would be required in this part of the programme.

PROPOSED BUDGET

Phase One

Grid Installation & Topographic Map	\$ 8,000.00	
Geochemical Surveys	8,500.00	
Induced Polarization	7,500.00	
Geological Mapping, Supervision	7,000.00	
Backhoe Trenching	2,500.00	
Contingency	3,500.00	
	<u>\$37,000.00</u>	\$ 37,000.00

Phase Two

Preparation of Drill Sites	\$ 2,000.00	
Diamond Drilling, 5,000 feet		
B.Q. @ \$20.00/ft	100,000.00	
Supervision, Logging, Assaying	10,000.00	
Contingency	11,000.00	
	<u>\$123,000.00</u>	\$123,000.00

Phase Three (contingent upon favourable results in Phases 1 and 2)

Detailed Drilling of Mineralized Zones		
10,000 feet B.Q. @ \$20.00/ft	\$200,000.00	
Supervision, Logging, Assaying	20,000.00	
Contingency	22,000.00	
		<u>\$242,000.00</u>

Total Proposed Budget		<u>\$402,000.00</u>
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Respectfully Submitted,

K.L. Daughtry, P.Eng.

July 23, 1980  
Vernon, B.C.

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STATEMENT OF QUALIFICATIONS

I, KENNETH L. DAUGHTRY, of R. R. 4, Vernon, British Columbia, DO  
HEREBY CERTIFY that:

1. I am a Consulting Geologist in mineral exploration.
2. I have been practising my profession for fifteen years in Canada, the United States, and Ireland.
3. I am a graduate of Carleton University, Ottawa, with a Bachelor of Science degree in Geology and Chemistry.
4. I am a member of the Association of Professional Engineers of British Columbia, Ontario, and Yukon Territory, and a Fellow of the Geological Association of Canada.
5. This report is based upon a thorough study and compilation of available data on the Tam O'Shanter property, and upon several days of field work on the property in 1979 and 1980.
6. I have no interest, direct or indirect, in the properties or shares of Oneida Resources Ltd., nor do I expect to receive any interest at any time.
7. Permission is hereby granted to Oneida Resources Ltd. to use this report to satisfy requirements of Securities Commissions and Stock Exchanges.

Vernon, B.C.  
July 23, 1980

K.L. Daughtry, P.Eng.

K. L. Daughtry & Associates Ltd.