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The Dryden Emerald Occurrence

Taylor Pegmatite

Zealand Township, NW Ontario

On behalf of

True North Gems Incorporated
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By

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(30 pages, data appendices, 2 maps in separate folder, CD)

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Photographs: Unless noted, all photographs were taken by the author.

Summary:

A regional map (1:2500) and a detailed map (1:200) of the Dryden emerald occurrence, Taylor pegmatite were completed during July/August 2003 and June 2004, in addition to removal of 1.5 tons of emerald-bearing rock for bulk sample purposes. This report discusses the field geology and bulk sampling part of the project. The details of the sample extraction processes, petrography, and geochemistry are covered in other reports.

The property consists of three claims, staked in 2003, just south of the Dryden airport in Zealand Township, in northwestern Ontario. True North Gems Incorporated, Vancouver, optioned the claims in 2003. Good ATV trails from both the western and eastern ends provides good access to the main part of the property.

The geology is dominated by the Ghost Lake batholith, a peraluminous granitic intrusion, and its rare-element pegmatites that occur in a field stretching over several kilometres to the east, in a zone characterized by extensive boron and beryllium metasomatism. The Taylor pegmatite intrudes metavolcanic rocks within the beryl-columbite zone of this metasomatic aureole. The 2003 regional mapping established the extent of the pegmatite-rich rocks of the Ghost Lake granite and the complex contact relationship with the biotite and amphibole schists that comprise the metavolcanic rocks. The 2003/2004 detailed mapping over the Taylor emerald pegmatite established that the pegmatite consists of three separate limbs, which may have a common source, although only two are emerald bearing. All limbs of this pegmatite intrude a wide zone of chlorite schist that sits between rusty metavolcanic biotite-feldspar schist and the end of a large peridotite sill-like body, and may be the faulted analogue of the peridotite. Emerald occurs proximal to a biotite schist, which has formed between two of the pegmatite limbs and the chlorite schist, and may play a role in localizing fluids responsible for emerald development. The source of the chrome necessary to produce emerald is either the peridotite, or its analogue, the chlorite schist.

Bulk sampling of one to two tons of rock for evaluation purposes was done using a diamond chain saw, to minimize trauma to the emerald and reduce the amount of waste rubble. Blocks taken from the emerald zone were examined carefully for emerald, and packed on site into tamper-proof five-gallon pails for shipping.

The Dryden Emerald Occurrence (Taylor Pegmatite)

M.I. Garland, P.Geo.

Introduction:

This part of the Dryden Emerald Project focuses on the geology of the Taylor emerald-bearing pegmatite and surrounding terrain in Zealand Township, northwestern Ontario. Detailed petrographic and chemical analyses and results of the bulk sample processing are covered in different reports.

Brad Wilson (prospector, Kingston, Ontario) staked three claims, comprising approximately 225 acres, over the Taylor pegmatite in the spring of 2003, consisting of claims 1247676, 1178788, and 1178789, bounded by UTM's 5518900N, 5517300N, 517900E, and 520750E. True North Gems Incorporated (TNG), Vancouver, acquired the claims in June 2003 through an option agreement with the claimholder. In the summer of 2003, TNG retained the author, assisted by Allison Brand (University of British Columbia, Vancouver, BC) to complete a regional geological map of the claim area (scale 1:2500), including a detailed map of the emerald-bearing pegmatite (scale 1:200). In June of 2004, TNG retained Brad Wilson and the author, assisted by Dawn Kellett (Queen's University, Kingston, Ontario) to undertake hydraulic and mechanical stripping of the pegmatite, finish the detailed map, and remove approximately 1.5 tons of emerald-bearing rock as a bulk sample for evaluation purposes.

The emerald occurrence is known in the literature as the Taylor pegmatite, after J. G. Taylor brought samples of "green beryl crystals" from the pegmatite to the Ontario Department of Mines sometime before 1941 (Satterly, 1941). A few 100 metres to the north of the emerald-bearing pegmatite is an extensive rusty sulphide horizon in metavolcanics, which has attracted the attention of various mining companies over the years. Table I lists the companies that have done mapping, diamond drilling, and/or geophysics in the vicinity of the claim group, either for sulphide mineralization or for emerald, and this information is available at the Ministry of Northern Development and Mines (MNDM) office in Kenora.

Table I: Companies that have been active in the claim group area, from the Assessment Files, Kenora Resident Geologist's Office, Kenora, Ontario

Green Ice Inc.	1995
Sanmine Explorations Inc.	1983
Tantalum Mining Corp.	1982
Selco Exploration Co. Ltd.	1979-1981 (core in Kenora Core Library)
Noranda Exploration Co.	1978
Taman Uranium Mines Ltd.	1970
Milestone Mines Ltd.	1956

The most comprehensive regional mapping in the area was done by J. Satterly, published in a 1941 Ontario Department of Mines report, followed by that of F.W. Breaks over a period of 12 years with the Ontario Geological Survey (OGS), published by Breaks and Kuehner in 1984 as a Preliminary Map (P. 2623). The OGS has been active in the Dryden area for several years, due to the geological interest in the rare-element pegmatite group in that region, and has published several articles on the local area, including field trip guides and preliminary maps (Blackburn, et al., 1982; Breaks and Janes, 1991; Breaks and Moore, 1992; Beakhouse, et al., 1995; Beakhouse, 2001; Beakhouse and Pigeon, 2003; Breaks, et al., 2003).

Background Geology:

The Taylor pegmatite occurs in the exocontact area between the Ghost Lake batholith and the surrounding metavolcanics and metasediments, a package of rocks situated in the boundary zone between the Winnipeg and Wabigoon subprovinces, defined now as the Sioux Lookout Terrane (Breaks and Moore, 1992). In addition to the migmitization and variable metamorphic grades associated with boundary zones between subprovinces, this particular terrane contains a belt of peraluminous granite plutons. The Ghost Lake batholith (2685 Ma), one of these peraluminous, S-type granites, intruded country rocks that display an increasing thermal metamorphic grade from south to north (see Breaks et al., 2003 for a thorough review of fertile granites and zonation of the rare-element pegmatites). Breaks and Moore (1992) subdivide the Ghost Lake batholith into eight zones, of which the most fertile and rare-element rich zones occur in the south and eastern sections. Most of the primitive batholith, in the northern part, consists of homogenous granite or granodiorite diatexite, with biotite and little muscovite. Large rafts of metasedimentary and metavolcanic country rock are ubiquitous. The eastern and southern parts of the batholith consist of younger phases, distinguished by muscovite, tourmaline, and garnet, and potassium-dominant pegmatites also with abundant muscovite and tourmaline, typical of geochemically fractionated cupola zones within peraluminous granites. The pegmatite dykes exhibit increased fractionation and volatile enrichment with increasing distance from the batholith, and can be subdivided into zones according to the characteristic index minerals present in the pegmatites. Proximal to the batholith, pegmatites contain beryl, and, with increasing distance, columbite, tantalite plus spodumene, then manganotantalite, spodumene and pollucite appear in addition to beryl. The Taylor pegmatite occurs within the beryl-columbite zone in this exocontact region. Breaks and Kuehner (1984) described in chart form the characteristics of the pegmatites that occur within the beryl-columbite zone (the Mavis Lake Subfield), summarized in Table II:

Table II: Characteristics of pegmatites in the Mavis Lake Subgroup (Breaks and Kuehner, 1984).

AREA/ OCCURRENCE	PEGMATTE STRUCTURE	CHARACTERISTIC PEGMATITE MINERAL ASSEMBLAGE	GEOCHEMICAL ASSOCIATION	DEGREE OF ALBITIZATION
Dryden Airport occurrence, Zealand Twp	Unzoned, barren Kspar pegmatites (internal)	Gt + musc + tourmaline + albite + qtz +Kspar + limegreen beryl	B-Be	Absent
Taylor Occurrence, Conc VII, Zealand Twp	Unzoned, Kspar pegs, marginal to Ghost Lake batholith	Beryl + tourmaline + albite +qtz + graphic kspar + columbite + gt + musc + green apatite	B-Be (Sn-Nb>Ta)	Incipient—pods of sugary aplite, with Cr mica, qtz, albite
Petrunka Occurrence, Brownridge and Zealand Twp.	Unzoned, tourmaline enriched, fracture-pillow selvedge controlled replacement in Brownridge volcanics	Qtz + plag + biotite + scheelite + tourmaline + py + holmquistite + fluorite?	W-B-F-(Li-Sn)	Not observed
Fairservice property, Brownridge Twp	Unzoned to poorly zoned external pegs, with green spodumene phenos	Beryl + green muscovite + albite + spodumene + kspar + qtz + blue apatite + gt + tourmaline + tantalite	Li-Be-Ta>Nb-B-(Sn-Rb)	Moderate development of albitization (white beryl, gt, green muscovite, cleavelandite, qtz)

Topography and Access:

The dominant topographical feature in the claim area is a large east-west trending ridge, with south-facing cliffs, approximately 30 to 40 m high. To the north, the ridge consists mostly of the Ghost Lake granite or derived pegmatites, outcropping as high, bare exposures of white rock in an area where average elevation is 300 to 400 m ASL. A tornado or high wind has created an extensive blow-down in the area between the east and west parts of the ridge, making travel in that area very difficult. Boulder fields obscure the western part of the ridge and sand and gravel outwash of the Hartman Moraine cover most of area north and east of the northern all terrain vehicle (ATV) trail. The area between the Dryden airport outcrop and the main ridge consists mainly of spruce swamp.

The claims are easily accessed from the east by the Zealand Township Road, which runs west from Airport Road (Highway 601), five kilometres east of Dryden. From the end of the Zealand Township Road, a good ATV trail crosses the central part of the claim group, giving access to most of the outcrop areas (Figure 1). For the eastern section of the claim group, good access is attained via the power line road, a branch of the Thunder Lake Road, which leads to the eastern end of the same ATV trails (Figure 1). The northern part of the claim group is accessed by either walking from the northern ATV trail, or from the Ghost Lake Road, near the Dryden airport.

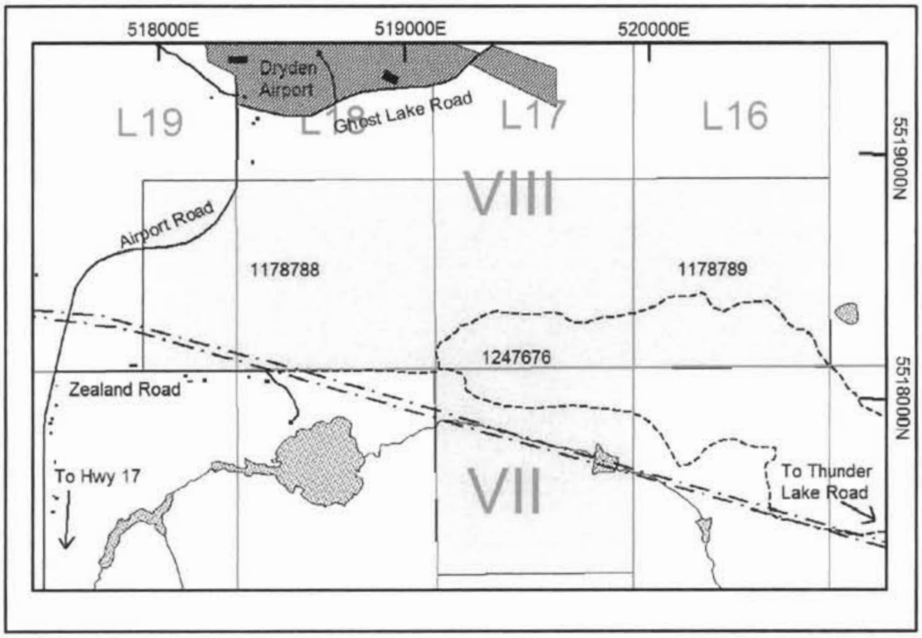

Figure 1: Location of the claim block and access points for the Dryden Taylor pegmatite emerald occurrence.

Regional Mapping:

For the regional map, set at a scale of 1:2500, a baseline (azimuth 090°, with a dog-leg around the blow-down) and GPS was used for control (NAD 83, UTM zone 15), in addition to Ontario Ministry of Natural Resources 1997 airphotos 97-4927A 58-195 and 196; 97-4928-A 56-47 and 48. Traverse and mapping data were plotted using Mapinfo 7. The map, titled "Dryden Emerald Occurrence, Regional Geological Map" is in a separate folder.

Lithological Units:

Three main lithological units were identified and the numbers correspond to the map units on the Regional Geological Map. Unit 1a is an altered ultramafic; Unit 2 consists of the schistose rocks (2a, 2b and 2c), which correspond to Satterly's Thunder Lake metasediments and Brownridge metavolcanics; and Unit 3 (3 ksp t) is comprised of the Ghost Lake granite and derived pegmatites.

Unit 1a:

Although Satterly (1941) shows this unit extending to the east of the claim area, outcrops were only found in the central part of the claim group, along the south-facing cliffs near the Taylor Pegmatite showing. It is exposed as a large ridge, about 30 m wide, rounded, brown on the weathered surface with spots (2-4 mm wide) due to the weathering of garnets (Figure 3). The rock is very soft and distinct in that it lacks foliation, unlike the metavolcanic rocks. It consists of felted blades of a fibrous green-grey mineral, possibly anthophyllite, with talc, chlorite and "eyes" of yellow-green relict olivine crystals. Satterly called this rock an altered peridotite, intruding as conformable sills within the amphibolitic metavolcanic rocks. The Kenora Resident Geologist analyzed two samples of the altered peridotite and its sheared analogue, both from the area around the Taylor pegmatite. Table III and Figure 2 show the elements used to determine the compositional field for the Taylor samples relative to the chemistry of other ultramafic rocks (from Irvine and Baragar, 1971). The complete data for these samples is in the appendix.

Table III: Selected chemical analyses for a selection of ultramafic rocks and the altered peridotite, plotted on the alkali-silica plot in Figure 2.

Sample	K2O wt%	Na2O wt%	K2O + Na2O	SiO2 wt%
From Irving and Baragar (1971)				
Tholeiite				
Picrite	0.30	1.60	1.90	46.40
Ol Thol	0.50	2.20	2.70	49.20
Thol	1.50	3.00	4.50	53.80
Calc-Alk				
Al-Basalt	0.70	2.90	3.60	49.10
Andesite	0.90	3.90	4.80	60.00
Dacite	3.00	4.50	7.50	69.70
Rhyolite	4.10	3.90	8.00	73.20
Peralkaline				
Pantellerite	4.30	6.70	11.00	69.80
Comendite	4.70	4.80	9.50	75.20
Alkaline Rocks				
Alk Picrite	1.20	1.60	2.80	46.60
K-rich Alk Basalt	2.00	2.80	4.80	42.40
Hawaiite	1.50	4.20	5.70	47.90
Trachybasalt	3.10	3.80	6.90	46.50
Trachyte	6.70	6.20	12.90	60.70
Phonolite	5.10	8.90	14.00	60.60
Peridotite from Dryden Occurrence (Kenora Resident Geologist's Office)				
TP 2 (chlorite schist)	2.40	0.39	2.79	46.40
TP 3 (peridotite)	nd	0.03	0.03	39.20

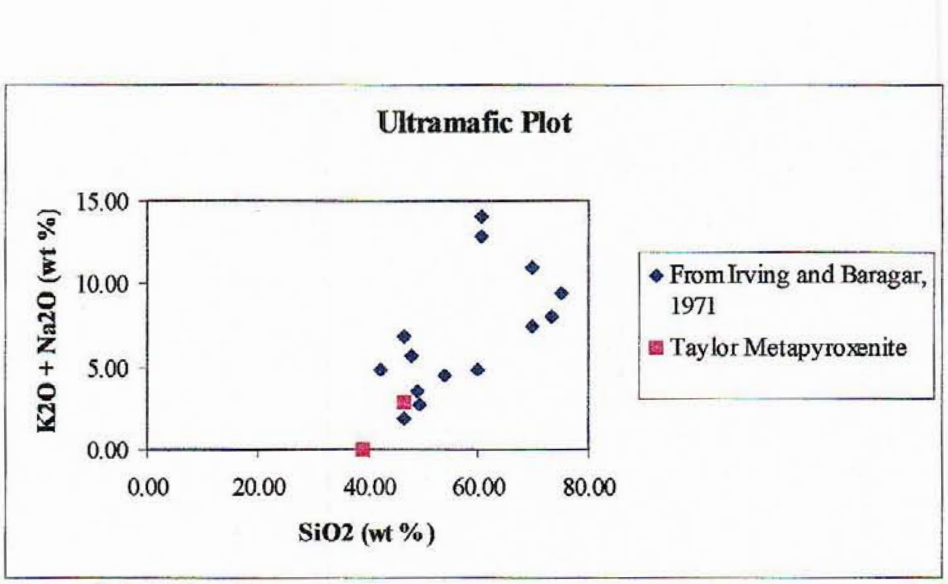

Figure 2: Alkali-silica plot for the data from Table III. The two peridotite samples plot in the subalkaline field, in the olivine-basalt compositional field.

Figure 3: Photograph showing the weathered surface of the altered peridotite.

Unit 2a:

Rocks of Unit 2a are found in a few outcrops in the west end of the mapped area, usually gradational with Unit 2b, and in low outcrops south of the main cliff and north of the power line in the central part of the area (Satterly's Thunder Lake metasediments). In the west, Unit 2a consists of well-foliated, fine-grained quartz-feldspar-biotite schist, with at least 30-40% (by volume) biotite. In places, the rock is very finely banded, almost gneissic, and has a sugary texture. The colour on the weathered surface varies from dark grey to almost pink, usually alternating on a centimetre scale.

The outcrops south of the main cliff face, in the centre of the claim group, consist of fine-grained, well-foliated, quartz-feldspar-biotite schist, with approximately 30% biotite. The overall colour on the weathered surface is pinkish, due in part to a higher percentage of feldspar. Fine banding, on a millimetre scale, is apparent on the weathered surface, but not on the fresh surface. This unit alternates with bands of crenulated muscovite schist, from 1-2 m wide, which increase in abundance north towards the cliff face (Figure 4).

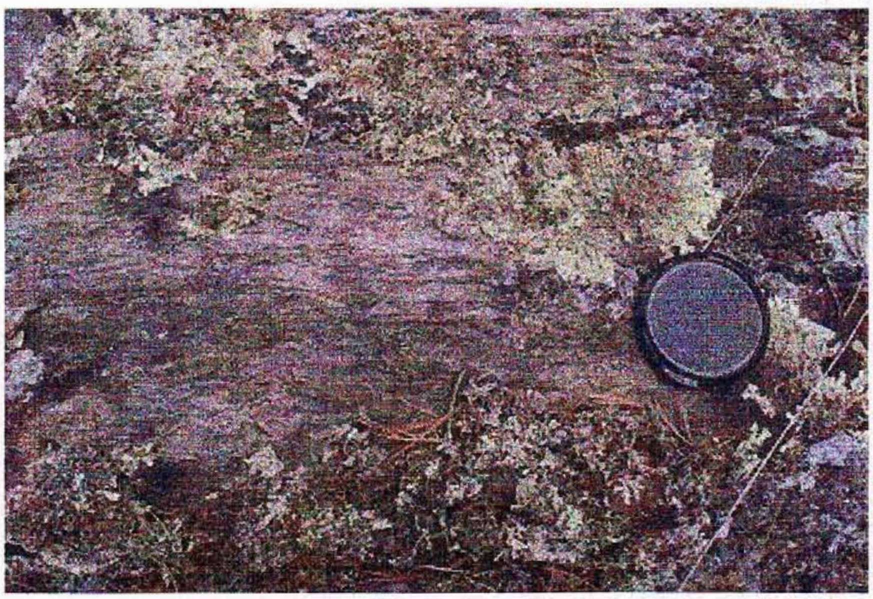

Figure 4: Crenulated muscovite schist within rocks of Unit 2a, near waypoint 129.

Unit 2b:

Unit 2b correlates with Satterly's Brownridge metavolcanics. Units 2b and 2c are gradational with each other, depending on the amount of hornblende in the rock. The mafic component of Unit 2b is primarily biotite, while that of Unit 2c is hornblende. In the western part of the area, Unit 2b occurs intercalated with pegmatite dykes, some ptygmatically folded, on a scale rendering separation difficult. On the map, this part of Unit 2b is termed "mixed", as it consists of a mixture of Units 2a, 2b and 3 ksp t, and likely represents a contact zone between the main body of schistose country rocks and the intruding Ghost Lake granite. Unit 2b in this zone consists of well-foliated, fine-grained, biotite-feldspar schist with red garnets, and some rusty bands. Foliation trends are 80-100° with dips vertical to steep north.

In the northeastern part of the map area, Unit 2b occurs as distinct outcrops in close association with large outcrops of the granite. These may be separate units of schist, or large rafts within the granite. The contacts with the granite are extremely sharp, with little intercalation and little in the way of alteration (Figure 5).

Figure 5: Contact between biotite-feldspar schist (unit 2b) and granite from the Ghost Lake batholith, showing the sharp contact between the two rock types.

In the central part of the claim group, Unit 2b is gradational with Unit 2c, and may represent slight variation within the volcanic sequence. Here, Unit 2b is dark grey to black on the weathered surface, black and white on the fresh surface, well-foliated, but not lineated. It consists of biotite ± hornblende (biotite > hornblende), feldspar, (± quartz, but feldspar > quartz) ± red garnets. Rust occurs in fractures, but not interstitially. Pegmatite stringers within Unit 2b at waypoints 111 and 112 contain epidote and diopside crystals associated with potassium feldspar (Figure 6).

Figure 6: Diopside and epidote in feldspar veinlets within amphibolite-rich bands of Unit 2b.

Unit 2c:

Unit 2c occurs in the central and eastern part of the map area, and forms the main body of Satterly's Brownridge mafic metavolcanics. In the central part of the map area, Unit 2c is gradational with unit 2b, forming lenses within Unit 2b. Unit 2c has a greater percentage of hornblende, a higher density, a distinctive "clotted" appearance on the weathered surface, the ubiquitous presence of interstitial rust, the development of tourmaline, and possibly holmquistite, although this mineral was not recognized in the field and requires petrographic analysis for confirmation. The "clotted" appearance is due to interstitial feldspar laths and knots of amphibole crystals, resembling a gabbroic texture (Figure 7). The feldspar laths define the foliation and amphibole crystals define the lineation (plunging west). Tourmaline, where present, is not parallel to either foliation or lineation. There is intense tourmaline development in this unit along the rusty zone explored by Sanmine, in association with silicification and a high percentage of sulphides (Figure 8). Breaks et al. (2003) report holmquistite in the amphibolite at this location.

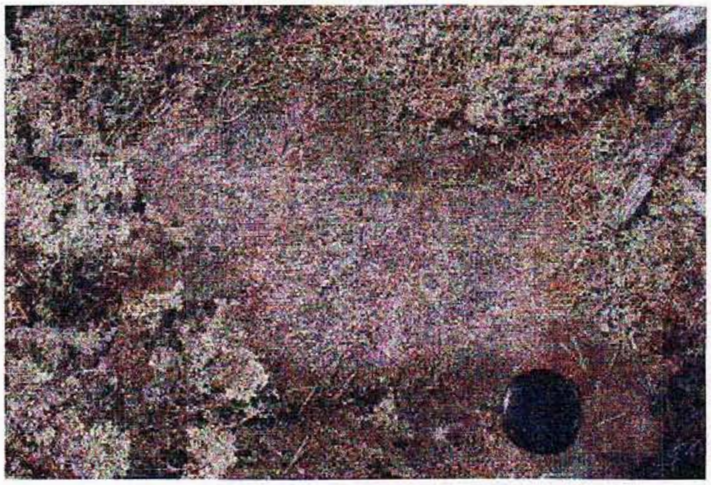

Figure 7: Weathered surface of amphibolite-tourmaline rock, showing the clotted surface features.

Figure 8: View of the former Sanmine occurrence (waypoint 136), showing the intense rusting of the metavolcanic rocks and development of tourmaline (black vein at left of photo).

Unit 3—3 ksp t:

All of the granitic/pegmatitic rock encountered consists of the potassium feldspar-rich, pegmatitic granite, corresponding to the Units 4-8 of Breaks and Moore (1992). This unit outcrops as high, rounded, bare exposures, usually over 25 m wide in any direction Figure 9).

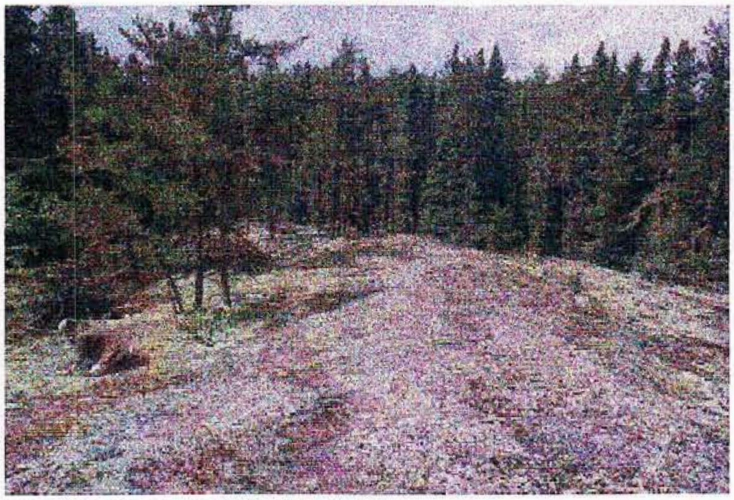

Figure 9: Overall view of the Ghost Lake granite, showing the large, exposed outcrops.

The rock weathers to a bright, white colour, but is salmon pink on fresh surfaces. Schistose units are usually present, as xenoliths, or in contact with or in outcrops proximal to the pegmatite. The larger outcrops tend to have an overall uniform texture, but on a metre-scale, the texture varies from:

- Extremely coarse, with potassium feldspar crystals over 30 cm long, and fingers of tourmaline (often over 10 cm long) perpendicular to the feldspar, with interstitial smoky quartz and large books of muscovite mica (Figure 10).
- Fine-grained, banded rock with alternating bands of feldspar + quartz and feldspar, quartz and tourmaline, and quartz + red garnet (aplite—Figure 10).
- Medium-grained quartz, feldspar (plagioclase + potassium feldspar), pink garnet, tourmaline, yellow muscovite, rare vivid blue apatite (mm size) and rare, pale, millimetre-sized green laths (Figure 11).

Occasionally the tourmaline is a deep, ultramarine blue, usually in smaller crystals. Satterly (1941) notes that in thin-section, the tourmaline is pleochroic violet/blue. Beryl crystals occur rarely, usually in smaller pegmatite dykes associated with the larger granitic outcrops. The beryl is porcellaneous, white to pale green, up to several centimetres long and up to five centimetres wide, although usually around 1-2 cm wide.

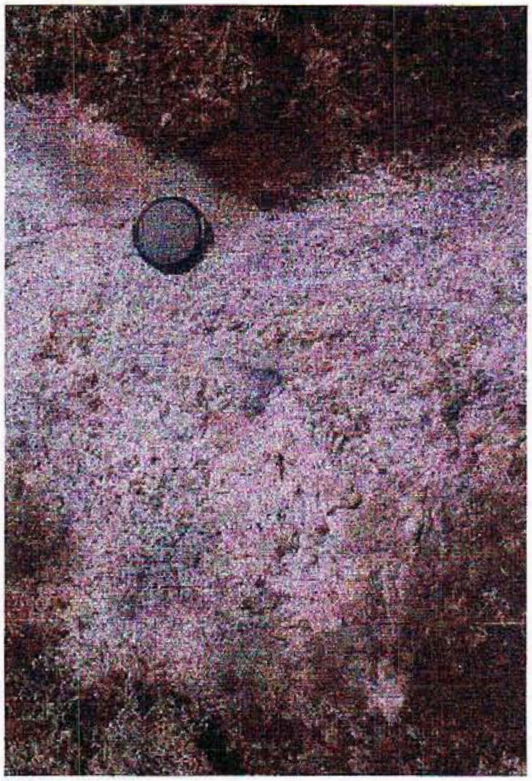

Figure 10: Part of the pegmatitic section of the Ghost Lake granite, showing very coarse grained potassium feldspar next to a finer-grained, aplitic section, near the lens cover.

Figure 11: Medium grained section of the Ghost Lake granite—potassium feldspar, plagioclase, tourmaline, yellow muscovite, usually with pink garnet, and rarely blue apatite.

The Taylor Pegmatite Emerald Showing:

The Taylor Pegmatite emerald showing was mapped at a scale of 1:200. Due to the resolution required at this scale, control was obtained using a grid with lines flagged at five metre intervals, running at 090° and 180°. To convert to UTM coordinates, two known points are needed, and these are: grid (0, 0) = 519577E, 5518121N and grid (5W, 15S) = 519535E, 5518196N. When detailed mapping was started during the 2003, it was quickly apparent that further work would require outcrop stripping and cleaning, which was accomplished in 2004 (Figures 12a and b). All the mapping data was transcribed into Mapinfo 7 and the final detailed map is titled the "Ghost Lake Emerald Occurrence, Detailed Map" and is enclosed in a separate folder.

Figure 12a: Several people from the Ministry of Northern Development and Mines examining the Taylor pegmatite, taken in June, 2004, before start of stripping and sampling (photograph by Brad Wilson).

Figure 12b: The Taylor pegmatite after stripping and sampling, June, 2004.

The Taylor pegmatites are actually two separate pegmatite bodies, called Taylor 1 and Taylor 2 in the literature, with Taylor 2 being emerald-bearing. This project focused only on the emerald-bearing pegmatite (Taylor 2) and not on the barren Taylor 1 pegmatite.

Both Taylor pegmatites intrude metavolcanic rocks within the beryl-columbite metasomatic zone—the first exocontact division of the Ghost Lake granite (Breaks and Janes, 1991; Breaks et al., 2003). The Taylor 2 pegmatite, called herein the Taylor pegmatite, consists of three parts—the western, central and southern limbs. All three may be related to the same intrusive body, although there are different contact relationships displayed by each pegmatite (Figure 13). The three limbs are in direct contact with, and have intruded into, a chlorite schist, which occurs between the altered peridotite (unit 1a from the regional mapping) and rusty biotite-amphibolite schist (units 2b and 2c from the regional mapping). Emerald occurs in the central and southern pegmatite limbs, but not the western limb.

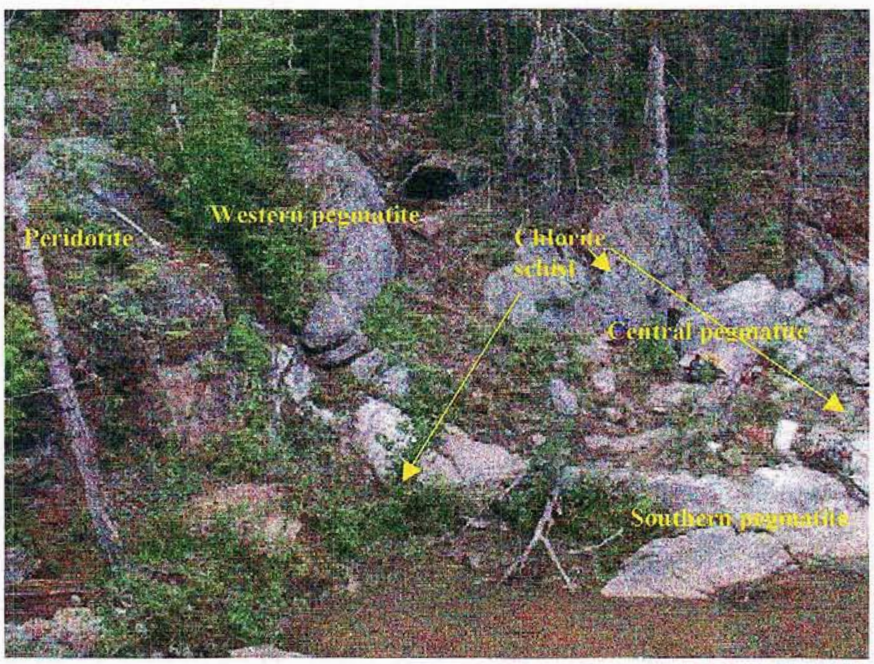

Figure 13: View of the Taylor pegmatite occurrence, showing the relationship between the three pegmatite limbs (western, central and southern), the peridotite, and part of the chlorite schist.

The southern pegmatite body, which disappears into the pond created by earlier bulk sampling, is a very coarse, potassic pegmatite with circular pockets of massive smoky quartz up to 15 cm in diameter. The potassium feldspar crystals are large, from 20 to 40 cm, rimmed by black tourmaline crystals, which tend to be oriented perpendicular to the edge of the feldspar. Tourmaline also occurs in the margin zones of the pegmatite, perpendicular to the contacts (Figure 14). Parts of this pegmatite are aplitic, with crenulated banding, containing pink garnets and a rusty metallic mineral, which could be ferrocolumbite. Biotite-rich areas occur as "smears" or as a thin crust on the weathered surface of this pegmatite, likely remnants from the more massive biotite schist associated with the central pegmatite. Black tourmaline, porcellaneous beryl crystals, blue-green apatite, and small emerald crystals occur within 30 cm of these biotite "smears" (Figure 15).

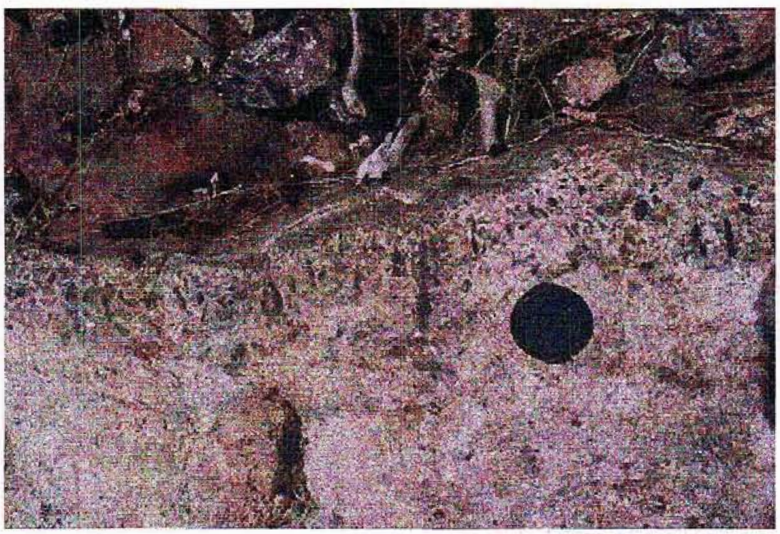

Figure 14: Tourmaline crystals in the southern pegmatite, oriented perpendicular to the contact of the pegmatite with the chlorite schist.

Figure 15: View, facing south, of the southern pegmatite. The dark patches are biotite "smears", around which occur beryl, apatite and emerald, denoted by the pink flagging tape. Also associated are large, black tourmaline crystals.

The western pegmatite outcrops as a ridge between the peridotite and the chlorite schist. It has a central, pink-coloured, quartz-rich core within a quartz-feldspar matrix, also pink-orange in colour. Although the contact with the peridotite is sharp, a metre-wide zone of tourmaline-quartz-apatite has developed in the pegmatite along this contact (Figure 16). This pegmatite limb continues under the debris from the clearing, although just to the north of the mapped area, it pinches to less than a metre in width (Figure 17). Apart from almost 20% (by volume) apatite in places within the tourmaline-rich part, no beryl or emerald was noted in this pegmatite limb.

Figure 16: Brad Wilson is standing on the western pegmatite—his left foot is on the contact with the tourmaline-rich zone. The sharp contact with the chlorite schist is visible near the centre of the image.

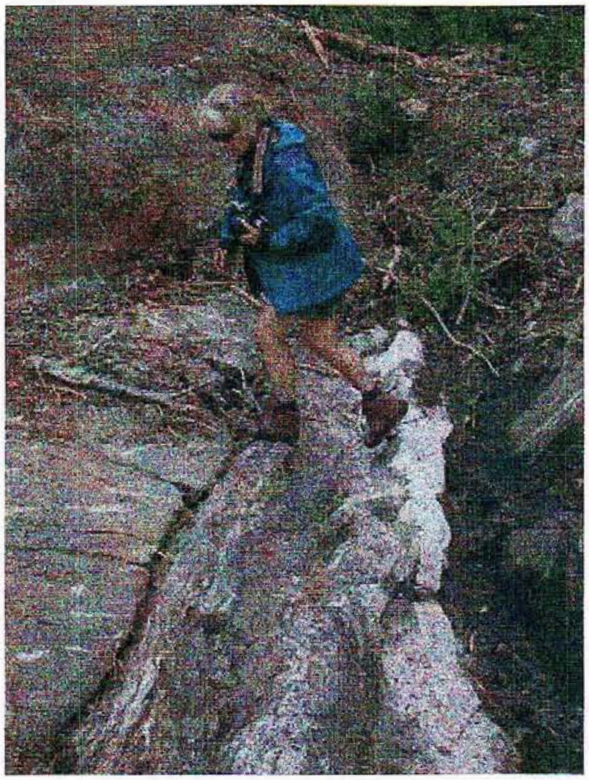

Figure 17: Image of the author stepping on the western pegmatite, north of the mapped area. Here this pegmatite pinches to less than a metre before disappearing under the topsoil. Also visible are the sharp contacts with the peridotite (left) and chlorite schist. (Photograph by Brad Wilson).

The central pegmatite limb outcrops within the two large areas of chlorite schist. This pegmatite limb is coarse-grained, pink to orange in colour, and consists of large potassium feldspar crystals, blue-grey albite, black tourmaline, and quartz (Figure 18). There are some aplitic areas, containing pink garnet and some rust development near the contact with the biotite schist, which is exposed between the pegmatite and its eastern contact with the chlorite schist. Emerald, porcellaneous beryl, and blue apatite crystals occur in this pegmatite, within 30 cm of the pegmatite-biotite contact.

The biotite schist (Figure 19) occurs between the central pegmatite and the chlorite schist and as relict patches on the surface of the southern pegmatite body. It consists of massive, coarse-grained, well-foliated, black biotite crystals, up to several millimetres in diameter, with minor interstitial quartz. Very shiny and black on fresh surfaces, it weathers to a brown colour. Distinct from the chlorite schist and the pegmatites, no tourmaline was noted in the biotite schist. Close to the zone of mixing, where most of the emeralds occur, the biotite schist does host some emerald mineralization.

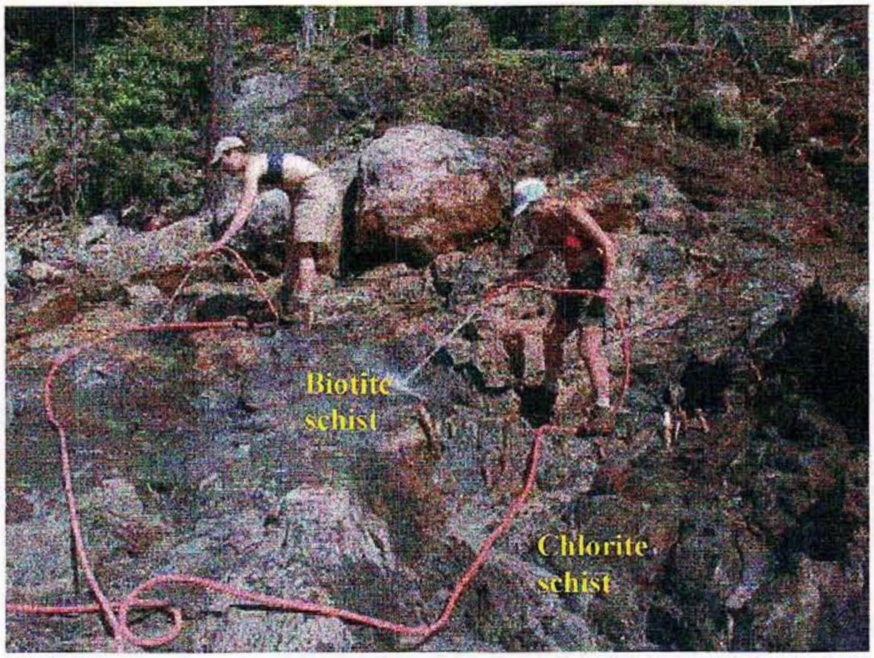

Figure 18: Dawn Kellett and the author cleaning the central pegmatite of rock dust from the saw. Note the presence of the biotite schist between the pegmatite and the chlorite schist (photograph by Brad Wilson).

Figure 19: Image of the main pit area, showing the black biotite schist that "drapes" over the central pegmatite. Pink flagging denotes emerald crystals (photograph by Brad Wilson).

The chlorite schist is exposed between the pegmatite limbs and is somewhat enigmatic as to its origin. It has been described as a contact effect, between the peridotite and the pegmatite (Breaks et al., 2003), although this would be based on observations made before the outcrop had been stripped. The exposure of the schist is more extensive than originally apparent prior to removal of the topsoil (Figure 20), and the question remains as to why the western pegmatite has such a sharp contact with the peridotite, and why other peridotite-pegmatite contacts do not show development of this schist (i.e. the Taylor 1 pegmatite). The schist occurs between the peridotite and the metavolcanics, and is the main host for all three pegmatite limbs.

It is brown on the weathered surface, grey to green on the fresh surface, foliated with a felted texture on the foliation planes. It is soft, friable and consists of chlorite, biotite, phlogopite, talc or a similar fibrous mineral, a magnetic rusty oxide, and a vitreous sugary green mineral that could be relict olivine. Tourmaline occurs within the schist, not uniformly, however, as glossy black needles, aligned along foliation planes. The chlorite schist between the southern and central pegmatites is quite sheared, with contorted foliation and tight fold development parallel to the contacts with those pegmatites.

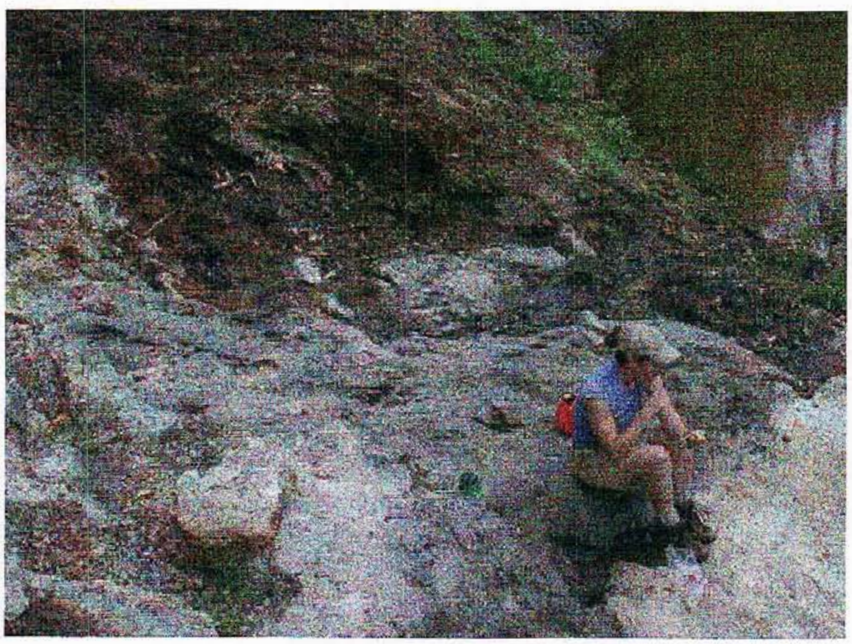

Figure 20: Dawn Kellett sitting on the contact between the chlorite schist and the southern pegmatite. All the grey-green rock in the photo is chlorite schist (Photograph by Brad Wilson).

The zone of mixing occurs in a localized contact region between the central pegmatite and the biotite and chlorite schists (Figure 21). This zone is the main locus for emerald development, containing the largest and best-coloured emerald crystals in the occurrence (Figure 22). The zone is complex, consisting of relict potassium feldspar crystals from the pegmatite, in a matrix of grey-green albite mixed with black biotite and tourmaline. Emerald is found in the dark matrix material, proximal to the relict potassium feldspar crystals (Figure 23). Although the emerald colour is good, the crystals tend to have rims of beige-coloured beryl, with the best green colour confined to the central part of the crystals (see Figure 22).

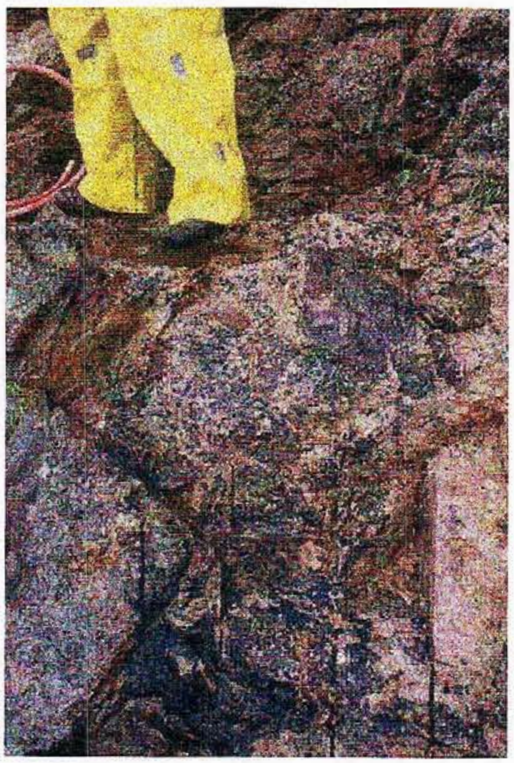

Figure 21: Photograph of the zone of mixing, showing the distinctive orange-coloured potassium feldspar of the pegmatite and the black biotite and tourmaline. The saw cuts are from the bulk sampling.

Figure 22: Photograph of emerald crystals in the zone of mixing/bulk sample area. Note the overall size of the emeralds as well as the lighter-coloured rims.

Figure 23: Emerald crystals in the grey albite/biotite/tourmaline matrix proximal to large, orange, relict potassium feldspar crystals (Photograph by Brad Wilson).

The host rocks to the east of the emerald occurrence, in contact with the chlorite schist, are metavolcanics and the rusty equivalents of units 2b and 2c from the regional mapping (biotite-feldspar and amphibole-biotite schists; Figure 24). The non-rusty metavolcanic rocks outcrop along the top of the occurrence ridge, trending ~090° with very steep south dips. The rock is very fine-grained, finely foliated biotite-feldspar schist, with local development of quartz lenses and pockets of epidote. The presence of sillimanite reflects the regional metamorphic grade. Towards the east the hornblende component increases, and the rock grades into a hornblende-biotite schist with quartz-feldspar-tourmaline lenses by the eastern edge of the mapped area. The rusty metavolcanic unit occurs in a wide band between the non-rusty metavolcanics and the chlorite schist, and along the southern edge of the metavolcanic ridge next to the pond. It is extensively oxidized, friable, and sugary, with local quartz-rich areas and lenses of cherty material. Visible pyrite and pyrrhotite were noted and the unit is magnetic.

Figure 24: The non-rusty and rusty metavolcanic units are visible on the right side of the image.

The structure in the local area of the emerald occurrence is complex. There are two arcuate fold axes: a synform within the rusty metavolanic rocks and an antiform within the chlorite schist, both trending approximately 060° and plunging northeast (~40-60°). The trend of these axes reflects the same trend recorded in the regional structure by

Satterly (1941) and Beakhouse (2001). The synform in the rusty metavolcanics shows compression and narrowing in the fold nose (Figure 25) and is likely a product of the regional structure. The antiform in the chlorite schist is more of a warp and is associated with kink folds (060/60°). The folding and warping in the chlorite schist may be due to the intrusion of the pegmatite, in addition to regional stresses. As mentioned earlier, the origin of the chlorite schist is problematic: it is too large to be simply an aureole effect from the pegmatite. The peridotite ends abruptly in contact with the pegmatite, although it does continue to the east, and is in contact with the second Taylor pegmatite as well as outcropping farther east in another small outcrop. The chlorite schist contains what could be relict olivine crystals and has chemistry similar to that of the altered peridotite (see Table III). The amount of fluid activity, evident by the oxidation in the metavolcanic rocks, formation of phlogopite and the extent of the chlorite schist could be the result of a large northwest trending fault that displaced the eastern extension of the peridotite and provided a focus for the pegmatite intrusion. The chlorite schist possibly resulted from fault activity and localized fluid channeled through this part of the peridotite. This would explain the diversity in contact relationships between the pegmatite, the peridotite and the chlorite schist, the contorted foliation parallel to the contact of the southern pegmatite, the gentle antiformal warping of the schist over the central pegmatite, and the tourmalinization of the chlorite schist.

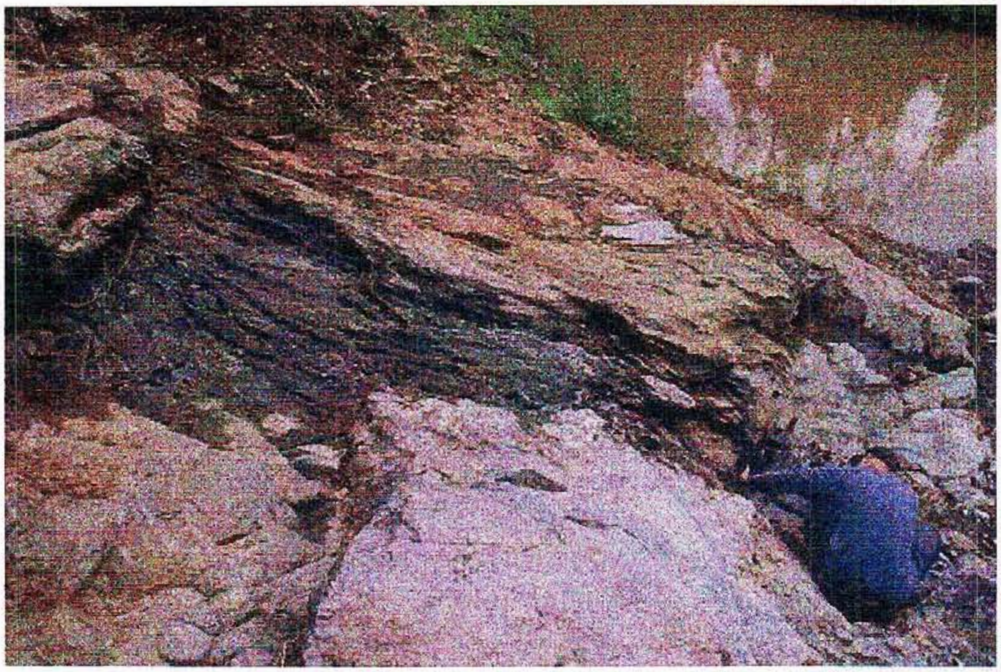

Figure 25: Facing east, the image shows the folds in the rusty metavolcanic rocks (top) and in the chlorite schist (centre). The fold in the rusty metavolcanic rocks pinches to a sharp fold nose toward the southwest (right side of photo).

Discussion:

This is a geologically complex occurrence and requires a thorough petrographic and chemical study to sort out the chronological and geochemical relationships within the package. The stripping and outcrop cleaning, suggested in the 2003 report, was essential to map in detail the spatial relationships of the various units and to see, at least, the geological parameters controlling the distribution of emerald. However, several questions remain:

- The source of the Cr, responsible for the emerald colour, is most likely the peridotite—why, then, do we not find emerald development at other peridotite-pegmatite contacts?
- Are the emerald crystals distinct from the porcellaneous beryl crystals, also found in the pegmatite, although not as concentrated as the emerald in the zone of mixing?

- What, chemically, is causing the beige rims on the emerald?
- What is the role, if any, of the biotite schist in the localization and formation of emerald?
- Chrome in beryl is Cr^{3+}, which is immobile relative to Cr^{2+}. If the source of the Cr is the peridotite, or its analogue the chlorite schist, it likely traveled as Cr^{2+}. What reactions occurred in the zone of mixing to oxidize the Cr and render it usable by the beryl?

This particular peridotite-pegmatite contact has extensive development of chlorite schist, a characteristic feature distinctive for this occurrence and not seen in any of the other peridotite-pegmatite contacts. The chlorite schist may be a sheared and highly altered part of the peridotite, possibly due to a regional fault, and may provide a conduit for the metasomatizing fluids emanating from the Ghost Lake batholith and its related pegmatites. These fluids would be able to access chrome from the chlorite schist, providing the required chemistry for the formation of emerald. The particular redox reactions responsible for the mobility and valence change of the Cr have yet to be determined. The pocket of mixed pegmatite, biotite, tourmaline and albite (zone of mixing) is the prime locus for emerald development. This area is contained by the pegmatite to the west and is enveloped by biotite schist that occurs between the mixing zone and the chlorite schist. The presence of relict biotite patches on the southern pegmatite would indicate that the biotite schist was far more extensive than in present outcrop and it is possible that the biotite acted as a barrier trapping fluids in this area long enough to allow extensive alteration and mineralization of new beryl as emerald.

Bulk Sampling Program:

True North Gem Incorporated decided to evaluate the feasibility of the emerald occurrence by taking out approximately one to two tons of emerald-bearing rock and sending this material to laboratories in Thunder Bay and Vancouver for processing. A diamond chain saw model ICS 633GC with a 16 inch bar, make by ICS, a division of Blount International Inc., of Portland, Oregon, was used to extract the rock. The chain is water cooled, to enhance chain wear and minimize dust, and this requires water delivered to the saw by a dedicated hose and pump assembly. For this project, a Honda fire pump with a one-inch, heavy duty hose delivered a steady supply of water from the existing pond.

Emerald mineralization has a high-degree of "nugget effect", thus the logistics of what to sample, what constituted sample material, and how the sample was to be split between Thunder Bay and Vancouver were agreed upon ahead of time by Brad Wilson and the author as follows:

- Material from the zone of mixing was considered sample-grade, unless the rock consists entirely of biotite schist from areas farther than 50 cm from the zone. Large pieces were broken by sledgehammer to check for any possible emerald mineralization.
- Material from the zone of mixing and biotite schist proximal to the zone was examined for emerald and beryl mineralization. Large pieces were broken into smaller chunks to aid this process.
- All low-grade material, rock with no visible emerald, was sent to Kennecott Can. Ex. in Thunder Bay to be run through an experimental process called "power pulse disaggregation".
- High-grade material—all rock containing visible emerald—was split with half going to True North Gems Inc. in Vancouver and the other half going to Kennecott in Thunder Bay.
- Of the Vancouver samples, very good material (exceptional emerald mineralization) was put into specially marked buckets.

Sample material was loaded into five-gallon, plastic, rock-sample buckets and sealed with tamper-proof lids at the site to ensure sample security. Buckets were labeled with field numbers to ensure proper identification of each, and renumbered with shipping numbers (see Tables IV and V) once the destination for each bucket was determined. The buckets were shrink-wrapped on pallets and shipped, via truck, by Manitoulin Transport. Sample security once off-site became the responsibility of Kennecott Can. Ex. and TNG.

Tables IV and V list the buckets by both field number (number assigned at the site) and shipping number, with comments where required.

Table IV: Sample buckets shipped to Vancouver, containing emerald-bearing rock, good display samples, and rock samples from the mapping program.

Buckets to True North Gems, Vancouver—10 buckets, 590 lbs		
Bucket Field Number	**Bucket Shipping Number**	**Comments**
6	1 of 10	Hand samples from mapping
18	2 of 10	
9	3 of 10	Best material
6	4 of 10	
22	5 of 10	Display samples
10	6 of 10	Best material
14	7 of 10	Best material
11	8 of 10	Best material
7	9 of 10	
4	10 of 10	

Note: Buckets 3 of 10, 6 of 10, 7 of 10 and 8 of 10 were pre-selected at site for shipment to Vancouver, based on the quality of sample. The other six buckets were selected randomly.

Table V: Sample buckets sent to Kennecott Can. Ex. Ltd., Thunder Bay, containing lower-grade material, and rock from the sample area with no visible emerald.

Buckets to Kennecott, Thunder Bay—27 buckets, 1702 lbs		
Bucket Field Number	**Bucket Shipping Number**	**Comments**
	Buckets 1-14 (incl.)	Material from sample area with no visible emerald
E 13	15 of 27	
E 3	16 of 27	
E 8	17 of 27	
E 12	18 of 27	
E 20	19 of 27	
E 19	20 of 27	
E 16	21 of 27	
E 21	22 of 27	
E 15	23 of 27	
E 1	24 of 27	
E 17	25 of 27	
E 2	26 of 27	
E 5	27 of 27	

Recommendations:

- This area needs detailed geochemistry to characterize all the different rock types and their relationships to each other, and to understand the processes involved in the formation of emerald. Whole rock analysis of the different rock types is essential, in combination with petrography. Trace element analysis of the chlorite schist, biotite schist and the zone of mixing is also essential, to determine the movement of trace elements, and fluids, within the system.
- This occurrence is a good candidate for a Bachelor's thesis or part of a Master's program.
- Examine the diamond drill core from Selco drilling, which is stored at the Kenora Drill Library
- Drill 1-2 holes to determine depth of the pegmatite—the deposit is oriented horizonatally, thus depth (or width) of the pegmatite has not been determined. There may be more biotite schist, with associated emerald in the pegmatite, at the lower contact.
- Drain pond, or pump out enough water to examine entire pegmatite, as the beryl zone extends into the water.

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Irvine, T.N. and Baragar, W.R.A., 1971: A Guide to the Chemical Classification of the Common Volcanic Rocks, Canad. J. Earth Sci., 8, 23-548.

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Appendix:

The first part of the appendix contains the chemistry of four rock samples, courtesy of the Kenora Resident Geologist's office, Kenora, Ontario. The chemical analyses were done by GeoLabs, the Ontario government geochemical laboratory at the Ontario Geological Survey in Sudbury, Ontario.

The samples, all from the Taylor pegmatite occurrence, are:

TP 1: rusty metavolcanic rock

TP 2: chlorite schist

TP 3: altered peridotite

TP 4: pegmatite (quartz-tourmaline vein)

The abbreviations for the analytical techniques are:

XWF-101 = Xray fluorescence for major element analyses

IM-100 = Inductively coupled plasma mass spectrometry (ICP-MS) for trace elements

IA-100 = Inductively coupled plasma atomic emission spectrometry (ICP-AES) for trace elements

Client ID	Location	Det Limit = / Units / Method	Ag	Au	Al2O3	CaO	Fe2O3	K2O	LOI	MgO
		Det Limit =	0_10	0_10	0_01	0_01	0_01	0_01	0_01	0_01
		Units	ppb	ppb	wt%	wt%	wt%	wt%	wt%	wt%
Client ID	Location	Method	GFA	GFA	XWF-101	XWF-101	XWF-101	XWF-101	XWF-101	XWF-101
PH-03-032	Taylor Pegmatite #1, Zealand				11.55	7.34	7.3	1.26	12.59	1.26
PH-03-033	Taylor Pegmatite #2, Zealand				8.82	7.37	12.51	2.4	2.71	17.3
PH-03-034	Taylor Pegmatite #3, Zealand				6.78	3.6	14.6	N.D.	7.98	26.38
PH-03-035	Taylor Pegmatite #4, Zealand				15.08	9.44	17.49	0.27	0.68	6.34

		MnO	Na2O	P2O5	SiO2	TiO2	TOTAL
		0_01	0_01	0_01	0_01	0_01	
		wt%	wt%	wt%	wt%	wt%	wt%
Client ID	Location	XWF-101	XWF-101	XWF-101	XWF-101	XWF-101	XWF-101
PH-03-032	Taylor Pegmatite #1, Zealand	0.25	0.36	0.07	57.39	0.41	99.78
PH-03-033	Taylor Pegmatite #2, Zealand	0.25	0.39	0.04	46.4	0.37	98.56
PH-03-034	Taylor Pegmatite #3, Zealand	0.19	0.03	0.02	39.2	0.29	99.07
PH-03-035	Taylor Pegmatite #4, Zealand	0.25	2.35	0.15	47.88	1.53	101.46

		Ba	Cd	Ce	Co	Cs	Cu	Dy	Er	Eu
		0.80	0.03	0.06	0.10	0.007	0.70	0.01	0.009	0.007
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Client ID	Location	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100
PH-03-032	Taylor Pegmatite #1, Zealand	131.69	>0.30	134.94	79.23	18.82	>140.00	5.65	1.92	3.06
PH-03-033	Taylor Pegmatite #2, Zealand	101.84	>0.30	6.26	67.74	>40.00	67.44	1.86	1.10	0.44
PH-03-034	Taylor Pegmatite #3, Zealand	22.08	0.14	2.87	102.16	3.40	16.76	0.76	0.53	0.17
PH-03-035	Taylor Pegmatite #4, Zealand	35.02	0.12	13.15	46.76	1.29	66.47	5.17	3.18	1.13

		Ga	Gd	Hf	Ho	La	Lu	Mo	Nb	Nd
		0.10	0.01	0.05	0.003	0.02	0.005	0.07	0.09	0.04
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Client ID	Location	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100
PH-03-032	Taylor Pegmatite #1, Zealand	20.18	8.77	2.82	0.82	69.41	0.25	>5.00	4.73	56.24
PH-03-033	Taylor Pegmatite #2, Zealand	8.70	1.41	0.85	0.40	3.05	0.19	0.80	0.90	3.85
PH-03-034	Taylor Pegmatite #3, Zealand	6.41	0.65	0.47	0.17	1.53	0.11	0.36	0.66	1.83
PH-03-035	Taylor Pegmatite #4, Zealand	20.81	4.22	2.49	1.11	3.54	0.47	0.64	4.15	11.12

		Ni	Pb	Pr	Rb	Sb	Sm	Sn	Sr	Ta
		0.80	0.40	0.01	0.07	0.50	0.01	0.07	1.00	0.07
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Client ID	Location	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100
PH-03-032	Taylor Pegmatite #1, Zealand	97.29	14.70	14.88	>250.00	ND	10.77	>10.00	100.08	0.39
PH-03-033	Taylor Pegmatite #2, Zealand	>300.00	2.20	0.85	>250.00	ND	1.13	>10.00	15.70	0.07
PH-03-034	Taylor Pegmatite #3, Zealand	>300.00	0.50	0.41	3.95	ND	0.50	3.94	12.49	ND
PH-03-035	Taylor Pegmatite #4, Zealand	68.92	0.70	1.95	14.22	ND	3.56	0.76	122.13	0.28

		Tb	Th	Tl	Tm	U	W	Y	Yb	Zn
		0.004	0.03	0.01	0.005	0.004	0.040	0.03	0.02	3.000
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Client ID	Location	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100	IM-100
PH-03-032	Taylor Pegmatite #1, Zealand	1.21	2.72	1.36	0.27	0.93	1.78	16.43	1.55	
PH-03-033	Taylor Pegmatite #2, Zealand	0.26	0.34	>2.00	0.20	0.14	0.28	10.86	1.14	
PH-03-034	Taylor Pegmatite #3, Zealand	0.11	0.19	0.09	0.10	0.32	0.63	5.22	0.62	
PH-03-035	Taylor Pegmatite #4, Zealand	0.73	0.55	0.17	0.52	0.14	0.36	31.40	3.11	

		Zr	Al	Be	Ca	Co	Cu	Fe	Li	Mg
		1.00	100.00	0.10	50.00	1.00	3.00	100.00	1.00	70.00
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Client ID	**Location**	IM-100	IA-100	IA-100	IA-100	IA-100	IA-100	IA-100	IA-100	IA-100
PH-03-032	Taylor Pegmatite #1, Zealand	113.93	45202.00	1.23	47416.00	73.00	1301.00	42974.00	115.00	6108.00
PH-03-033	Taylor Pegmatite #2, Zealand	30.40	40217.00	0.64	47560.00	73.00	70.00	74500.00	>130	>60000
PH-03-034	Taylor Pegmatite #3, Zealand	18.17	31044.00	0.79	22696.00	110.00	11.00	90158.00	2.00	>60000
PH-03-035	Taylor Pegmatite #4, Zealand	90.86	64760.00	0.40	59469.00	46.00	63.00	>100000	>130	32848.00

		Mn	Ni	Sc	Ti	V	Zn
		1.00	3.00	0.30	10.00	0.60	2.00
		ppm	ppm	ppm	ppm	ppm	ppm
Client ID	**Location**	IA-100	IA-100	IA-100	IA-100	IA-100	IA-100
PH-03-032	Taylor Pegmatite #1, Zealand	1463.00	91.00	11.50	1921.00	63.20	1427.00
PH-03-033	Taylor Pegmatite #2, Zealand	1556.00	315.00	28.70	1734.00	149.30	192.00
PH-03-034	Taylor Pegmatite #3, Zealand	1236.00	698.00	22.80	1258.00	107.30	125.00
PH-03-035	Taylor Pegmatite #4, Zealand	1506.00	81.00	31.70	7572.00	293.70	138.00

Photographs	2003		
Picutre Number	**Waypoint**	**Stop Number**	**Description**
Roll 1			
P-1	field trip		Truck
P-2	field trip	Aubrey Creek Stop	Aubrey contact zone between Ghost Lake Batholith and metaseds.
P-3	field trip	Oxdrift	Rock of the Ghost Lake Batholith--biotite granite
P-4	field trip	Oxdrift	South face of road cut, showing structure in the batholith
P-5	WP 47	Stop 1	boulder field
P-6	WP 48	Stop 2	slab of white granite showing pegmatitic sections
P-7	WP 49	Stop 2	large boulders of schist and arkose,
P-8	WP 52	Stop 3	quartz with green mineral
P-9	WP 52	Stop 3	coarse-grained tourmaline
P-10	WP 53	Stop 4	coarse Kspar with large tourmaline crystals
P-11	WP 54	Stop 5	detail of texture in granite, showing coarse pockets
P-12	WP 54	Stop 5	overall photo showing outcrop
P-13	WP 56	Stop 7	detail showing sheared contact between schist of Unit 2b and pegmatite
P-14	WP 59	Stop 1	overall view of boulder field
P-15	WP 60	Stop 2	detail of intercalated contact between schist and pegmatite
P-16	WP 60	Stop 2	large kspar crystal with quartz in pegmatite
P-17	WP 62	Stop 4	quartz vein in schist
P-18	WP 63b	Stop 5	detail of two textures in granite--large kspar and banded material
P-19	WP 65	Stop 6	overall view of flat granite outcrop
P-20	WP 65	Stop 6	detail of textural differences in granite, with yellow mica concentrated at edges of finer-grained material
P-21	WP 65	Stop 6	detail of mica book associated with large Kspar crystal and quartz
P-22	WP 66	Stop 7	contact between schist and granite
P-23	WP 66	Stop 7	detail of banding in granite
P-24	WP 69	Stop 10	schist with folded pegmatite vein
P-25	WP 75	Stop 1	detail showing coarse grained texture in pegmatite
P-26	WP 76	Stop 2	fine banding in schist
Roll 2			
P-1	WP 77	Stop 3	overall outcrop
P-2	WP 77	Stop 3	detail showing texture in pegmatite, coares Kspar with tourmaline and med-gr matrix
P-3	WP 78	Stop 4	tourmaline lenses in contact between schist and pegmatite
P-4	WP 78	Stop 4	detail of schist with garnet and tourmaline
P-5	WP 79	Stop 5	biotite/hornblende schist
P-6	WP 90	Stop 2	detail of chlorite seam in hbld/biotite schist, with tourmaline development
P-7			
P-8	WP 93	Stop 5	overall view of large granite outcrop

Picutre Number	Waypoint	Stop Number	Description
P-9	WP 93	Stop 5	band of tourmaline crystals associated with rust
P-10	WP 94	Stop 6	large area in granite of very coarse-grained feldspar and tourmaline, surrounded by finer-grained banded material
P-11	WP 94	Stop 6	possibly large beryl crystal in a large microcline crystal
P-12	WP 94	Stop 6	flat boulder showing typical texture of granite
P-13	WP 94	Stop 6	overall view of large granite outcrop
P-14	WP 95	Stop 7	finer-grained section of pegmatite with lenses of garnet-quartz
P-15	WP 99	Stop 2	photo showing the various textures in the granite
P-16	WP 99	Stop 2	view of outcrop
P-17	WP 103	Stop 4	vein of perthitic feldspar in matrix of coarse feldspar/quartz--tourmaline concentrated between the two
P-18	WP 108	Stop 5	detail of large Kspar with tourmaline
P-19	WP 108	Stop 5	detail of medium-grained quartz/feldspar texture in granite
P-20	WP 109	Stop 6	zone of tourmaline in hornblende schist
P-21	WP 109	Stop 6	scenic view to the west showing the Dryden mill
P-22	WP 109	Stop 6	detail showing folding of bands in granite
P-23	WP 109	Stop 6	detail showing development of mica at contact between coarse and medium sections of granite
P-24	WP 110	Stop 7	detail of epidote and diopside in feldspar stringers in hornblende schist
P-25	WP 110	Stop 7	ptygmatically folded and zoned pegmatite in hbld schist
P-26	WP 112	Stop 9	en echelon feldspar stringers with diopside and epidote
Roll 3			
P-1	WP 112	Stop 9	detail of epidote and diopside in feldspar stringers in hornblende schist
P-2	WP 113	Stop 1	photo showing contact between rusty and non-rusty hbld schist
P-3	WP 113	Stop 1	5 cm wide greenish crystal that may be beryl crystal
P-6	WP 113	Stop 1	tourmaline and quartz vein
P-5	WP 113	Stop 1	lens with serpentinite (or chlorite) and possible scheelite
P-6	WP 113 east	Stop 1	overview of Sanmine's stripped area
P-7,8,9	WP 114	Stop 2	Breaks' contact beryl zone--detail of beryl crystals in feldspar-tourmaline pegmatite in hbld schist
P-10	WP 114	Stop 2	quartz vein and tourmaline crystals in hbld schist
P-11	WP 114	Stop 2	detail of contact between pegmatite and hbld schist
P-12	WP 116	Stop 3	detail of large Kspar enveloped in muscovite and chlorite
P-13	WP 116	Stop 3	detail of zoned pegmatite with scalloped contact with hbld schist
P-14	WP 116	Stop 3	overall view of complexity of pegmatite and hbld schist units
P-15	WP 116	Stop 3	quartz vein with tourmaline and tourmaline-rich hbld schist
P-16	WP 116	Stop 3	view of tourmaline-rich pegmatite cross-cutting banded part of pegmatitic granite

Picutre Number	Waypoint	Stop Number	Description
P-17	WP 129	Stop 3	crenulated muscovite schist
P-18	WP 140	Stop 9	weathered surface of altered ultramafic, showing spotted feature
P-21	WP 140	Stop 9	weathered surface of tourmaline hbld schist
P-20	Showing		view of pegmatite by the water--pink flagging denotes presence of emerald and apatite--can see association with biotite schist
P-19	Showing		poikiolitic tourmaline with blue apatite and green emerald
P-22	Showing		view of main showing, note biotite schist "smeared" over pegmatite
P-23	Showing		edge of pegmatite in contact with chlorite, showing tourmaline development in the contact zone
P-24	Showing		overall view of showing
P-25	Showing		white pegmatite at edge of water, showing very coarse tourmaline and beryl zone in centre of pegmatite
Photographs	**2004**		
Roll 1			
P-1	Showing		Dawn Kellett on outcrop first day of washing
P-2			Desmond Munn in Kubota excavator
P-3			outcrop
P-4			Dawn K. on stripped bottom part of outcrop
P-5	Showing		facing north--contact of ultramafic/pegmatite/tourmaline vein
P-6	Showing		taken from the UM, facing NE
P-7	Showing		contact relations and the pink quartz between the qtz-feldspar pegmatite and tourmalinite
P-8	Showing		tourmaline fan and colourless quartz, with blue apatite, near area of P-7
P-9	Showing		Brad using the diamond chain saw
P-10			note run-off from cutting--extensive
P-11	Showing		orange K-feldspar and tourmaline, showing the cuts from the chainsaw--some emerald crystals visible
P-12	Showing		photo of the main "pit" where bulk sampling is being done--showing the emerald-bearing pegmatite lying under the chlorite schist
P-13	WP 159		lady slipper orchids
P-14	Showing		emeralds in the contact zone
P-15	Showing		beryl and emerald concentrated in the biotite-rich area in the contact
P-16	WP 170		band of stretched pillows
P-17	Showing		fold in the rusty volcanics, showing synform--facing N
P-18	Showing		folds from the top, facing S
P-19	Showing		pit showing sample removal and emeralds in the host rock
P-20	Showing		view of the western area of reclamation
P-21	Showing		view of the top part of the reclamation

Picutre Number	Waypoint	Stop Number	Description
P-22	Showing		view lookoing over stripped area, to the south, and Dawn Kellett
P-23	Showing		view of outcrop facing S
P-24	Showing		Brad Wilson sampling with the diamond chain saw
P-25	Showing		from top, facing south--rusty volcanics, then zone of mixed rock, and then pegmatite
P-26	Showing		Brad Wilson checking rock, facing NE--can see UM/pegmatite contact, both in contact with the chlorite schist
P-27	Showing		Brad W. standing on the chlorite schist
P-28	Showing		detail of the emerald-rich area in the bulk sample area
P-29	Showing		BW on pegmatite--left foot is on the tourmaline vein--pegmatite in contact with the chlorite schist
P-30	Showing		detail of the pegmatite-UM contact
P-31	Showing		from south side of pond, facing N, showing the whole exposure and the amount of stripping
P-32	Showing		Brad W. on the ATV
P-33	Showing		Brad W. on the ATV
P-34 to P36	Rugby Lake		Rugby Lake Lodge, Dryden area

Samples								
Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
Samples from 2003 mapping								
03--01					Aubrey Creek Stop	cgr pegmatite granite with cordierite from road cut	#1	Aug 8/03
03--02					Oxdrift road cut	sample of GLB-1, biotite-sillimanite granite; sillimanite, muscovite, apatite and tourmaline in outcrop	#1	Aug 8/03
03--03					Oxdrift road cut	piece of fibrolite and apatite	#1	Aug 8/03
03--04 (TP-01)					Taylor showing	from pegmatite--large tourmaline with large grey-green apatite (?--not 100% sure) and gemmy blue-green apatite(?) in same piece	#1	Aug 8/03
03--05	518076	5518395	518055	5518468	Stop 3:large open flat outcrop flanked by large boulder field on N, S and W	fngr, well-foliated but not quite gneissic, consists of almost 50/50 feldspar and mafics--mafics are biotite and possibly hbld.	#1	Aug 8/03
03--06 (TP-02)	518076	5518395	518034	5518451	Stop 3:large open flat outcrop flanked by large boulder field on N, S and W	cgr granular pegmatite, with tourmaline, garnet, yellow muscovite, and bright green sugary mineral (stain?)	#1	Aug 8/03
03--07	518120	5518505	518098	5518505	Stop 4:50 m east along ridge from Stop 3-sample from north edge of outcrop	dk grey rock, fn gr, well-foliated, consists of 60% mafic (biotite + hbld) and interstitial feldspar	#1	Aug 8/03
03--08 (TP-03)	518120	5518505	518134	5518495	Stop 4: main part of outcrop	irregularly grained, qtz-feld-tourmaline with garnet and yellow mica--feld is Kspar but looks white on wx surface-much pinker on fresh surface	#1	Aug 8/03
03--09 (TP-04)	518158	5518438	518150	5518409	Stop 5: very large outcrop	overall uniform texture, but in detail, pockets of coarser material, with coarse tourmaline and shears of muscovite--ghost like patches of finer-gr material--pink on fresh surface, indicating sig portion of Kspar	#1	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--10 (TP-05 peg)	518078	5518347	518126	5518320	Stop 7: low outcrop in boulders--interlayered metavol and granite--sample from metavol in contact zone	fn gr, well foliated, and crenulated, biotite + hbld, feldspar, peg stringers are boudined	#1	Aug 8/03
Jul-28								Aug 8/03
03--11			518388	5518262	Stop 1: WP 59	Schist from 2 large boulders-fn gr, mafic, biotite + hbld and rust, quite dense, well foliated, possible garnet	#1	Aug 8/03
03--12	518416	5518381	518413	5518305	Stop 2, near west end	Schist, sugary, fn gr, more feldspar (~50%)	#1	Aug 8/03
03--13 (TP-06)	518416	5518381	518391	5518329	Stop 2, from granite	granite, showing two grain sizes--feld, qtz, tourmaline, some garnet (pink), wethering rind (1 cm)	#1	Aug 8/03
03--14	518446	5518333	518456	5518333	Stop 3, from middle of OC	mafic schist from near contact--well foliated biotite and hbld--no garnet	#1	Aug 8/03
03--15	518514	5518413	518506	5518404	Stop 5, little open area just south of large open OC-sample from near centre of OC	med and c gr, qtz, feld (Kspar and plag), tourmaline, some pink garnet, yellow mica	#2	Aug 8/03
03--16	518530	5518452	518503	5518501	Stop 6: large OC--northern lobe	rock consists of feldspar, qtz, pink garnet, tourmaline, yellow mica and patches of possibly sillimanite, rare blue apatite--this sample has blue apatite	#2	Aug 8/03
03--17 (TP-07)	518530	5518452	518525	5518490	Stop 6: large OC--northern lobe	white, almost banded feld, qtz, pink gt, yellow muscovite, tourmaline--both cgr and med gr textures	#2	Aug 8/03
03--18 (TP-07b)	518495	5518449	518507	5518449	Stop 7: large OC--southern lobe, large raft of schist between lobes	mgr, uniform granite, from near eastern edge--qtz, feld, mica, pink gt, and tourmaline	#1	Aug 8/03
03--19	518517	5518284	518533	5518287	Stop 9: west end of lower ridge--intercalating bands of schist and pegmatitic granite	from peg band, has prism of green mineral--check	#2	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--20	518588	5518271	518579	5518268	Stop 10: cliff edge--amphibolitized schist--peg and felsic schist	from mafic amphibolite schist, rusty, with vein	#1	Aug 8/03
Jul-29								Aug 8/03
03--21	518747	5518268	518739	5518248	Stop 1: edge of cliff, east end of first ridge	biotite schist, well foliated, biotite (hbld) + feldspar, some rust in fractures, no garnets	#1	Aug 8/03
03--22	518747	5518268	518743	5518262	Stop 1: peg between two schist units	sugary, plag laths, qtz (smoky), tourmaline and blue apatite, yellow mica	#1	Aug 8/03
03--23	518747	5518268	518753	5518291	Stop 1: schist unit on the north edge of OC	sugary qtz + feld, biotite schist with garnets retrograded to plag, some gneissic development	#1	Aug 8/03
(TP-08)	WP 76				Stop 2: open OC on BL			Aug 8/03
03--24 (TP-09a and TP-09b)	518595	5518310	518687	5518325	Stop 3: elongated OC just northeast of Stop 2	pink, coarse gr peg, with Kspar nodules and whiter, tourmaline-feld-qtz matrix, large blue apatite		Aug 8/03
03--25	518591	5518432	518604	5518424	Stop 4: OC on west end of blow down on north side of ridge, near top	dk grn-grey schist, biotite-hbld + plag with wx knobs of relict gt? Altered to plag--this schist has tourmaline in places		Aug 8/03
03--26	518591	5518432	518606	5518435	Stop 4: from granite between two schist units	cgr, lots of yellow mica, gt, and large tourmalines	#1	Aug 8/03
03--27			518596	5518493	Stop 5:WP 79--ridge of hill, north of Stop 4, just east is steep valley	schist--fn gr, biot/hbld + feld schist, no garnets	#1	Aug 8/03
03--28 (TP-10)	518013	5518659	518000	5518577	Stop 6: south of highway, on west CL	C gr granite with lots of pink garnets, plag, tourmaline, qtz--not much aplite or finer-gr parts, some yellow mica	#1	Aug 8/03
Jul-31								Aug 8/03
03--29	519302	5518315	519302	5518308	Stop 1:At ATV trail	Schist--fn gr, biot + hbld + pyrite (minor)	#2	Aug 8/03
03--30	519296	5518322	519271	5518334	Stop 2:north along ridge, near trail	dense, fn gr schist, with tourmaline developed in schist, near chlorite schist, some chlorite schist in sample	#2	Aug 8/03
03--31	519301	5518413	519325	5518431	Stop 4:ridge just west of Sanmine stripped area	biotite-hbld schist, one piece showing texture of wx surface--tourmaline development in schist	#2	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--32	519216	5518434	519184	5518418	Stop 5:large OC part of main ridge	med gr, sugary, qtz, feld, tourm, yellow mica, pink garnets and lime green lath-shaped crystals (not identified)	#2	Aug 8/03
03--33	519269	5518497	519247	5518484	Stop 6: west end of large OC	med and cr gr granite, qtz, feld, yel mica, pink gt, tourmaline, showing tourmaline growth at edge of cr gr, very tiny blue apatite between coarse and med gr sections	#2	Aug 8/03
03--34 (TP-11)	519325	5518501	519335	5518497	Stop 7: Close to top before Sanmine brush	cr and med gr peg with clots of qtz and gt--gt is redder in clots than the pink gt in the matrix of the granite	#2	Aug 8/03
03--35	519344	5519319	519423	5519299	Dryden airport outcrop	sample with yellow mica and yel-green laths, but these probaby arent the lime green beryl--the lime green beryl is a more golden colour	#2	Aug 8/03
Aug-01								
03--36	519402	5518558	519351	5518567	Stop 1: top of last ridge, west of Sanmine cut, near top of ridge	Mafic schist--fn gr, hard, dk green to dk grey, chlorite rich on fresh surface--needles of what may be tourmaline	#2	Aug 8/03
03--37	519407	5518685	519366	5518680	Stop 2: on top of last ridge--large granite OC	White granite with very coarse sections--piece shows textures, small piece has blue tourmaline (near edge of sample)	#2	Aug 8/03
Aug-02								
03--38 (TP-12)	519278	5518304	519265	5518301	Stop 3: on ATV trail, mafic schist	mafic schistose rock-unusual green colouration- with felsic clots--hbld common (60/50 mafic/felsic)-sample consists of 2 pieces of mafic schist-one piece has bit of peg--from near contact	#3	Aug 8/03
03--39 (TP-13)	519404	5518395	519392	5518394	Stop 5: large OC adjacent to ATV trail	granitic peg., with large aplite areas and v. c. gr. Pegmatites--pegs have coarse feld, tourmaline, and large musc books--clots and crystals of Kspar have tourmaline at edges--sample is a piece of Kspar with possible columbite/tantalite crystal--black, submetallic, squarish section and hard	#3	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--40	519412	5518421	519392	5518421	Stop 6: top of hill from stop 5	OC consists of mafic schist in contact with pegmatite--feld xeno with possible dumortierite--scample is mafic schist, showing "gabbroic" texture of feld interstitial to mafic minerals, minor pyrite, some red gts, very dense	#3	Aug 8/03
03--41 (TP-14)	519465	5518392	519462	5518400	Stop 7: on flank of large hill	OC consists of mafic schist in contact with pegmatite--mafic schist is very hard (silicified?), stringers of feld and chorite in schist and epidotization at margins of feld within schist and pegmatite--zoning within feld stringers in schist consists of epidote, altered feld, Kspar, then crystals of diopside (chalky green). Sample is from pegmatite next to mafic rocks containing folded peg--kspar, tourmaline, yellow mica-cgr.	#3	Aug 8/03
03--42	519592	5518495	519613	5518474	Stop 8: top of highest hill	mostly mafic schist with rusty qtz stringers--rusty, rotten wx, hbld, biot, + feld schist, with rusty qtz--gt and green diopside development in feld veinlets and pods, some epidote--lots of rust, no obvious sulphides	#3	Aug 8/03
03--43	519570	5518587	519552	5518581	Stop 9: low ridge to north of high peak	OC ridge of mafic schist, with peg contact, and area of peg intrusions into mafic schist--sample consists of peg and mafic schist	#3	Aug 8/03
Aug-04								Aug 8/03
03--44	519531	5518310	519472	5518302	Stop 1: Sanmine OC--rusty, western end of stripped area along ATV trail--from western end, about 50 m west of GPS readings	massive, foliated, but with clots of hbld, secondary foliation across main foliation--black, non-rusty, hbld, biot, feld foliated metavol.	#3	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--45	519531	5518310	519477	5518311	Stop 1:	sample from rusty section of the massive hbld schist (metavol)--this rock is slightly finer gr. than the massive hbld schist, and has noticeable pyrite dissem throughout, and possibly more qtz.	#3	Aug 8/03
03--46	519531	5518310	519449	5518326	Stop 1: at contact between peg granite and rusty hbld schist	three samples from contact zone between peg granite and hbld schist--contact has 30 cm of micaceous schist with tourmaline, then 1 m of very tourmaline-rich rock between peg and hbld schist	#3	Aug 8/03
03--47a	519531	5518310	519533	5518311	Stop 1: at area of GPS reading	from north to south, sequence consists of more felsic schistose volcanic, rusty zone, and more mafic volcanic. Sample 47a is from the very dark, hbld schist	#3	Aug 8/03
03--47b	519531	5518310	519532	5518314	Stop 1	this sample is from the very rusty, qtz rich rock with pyrite dissem, in aggregations, crystals, and lenses of massive py up to 10 cm long	#3	Aug 8/03
03--47c	519531	5518310	519532	5518318	Stop 1	This sample is from the more felsic volcanic, consists of more feldspar, hbld, some biot, some qtz, and dissem pyrite--light green-grey on fresh surface	#3	Aug 8/03
03--48	519613	5518336	519618	5518332	Stop 2: farther along rusty OC next to ATV trail--consists of OC of rusty and non-rusty hbld schist in contact with peg granite	one feldspar-tourmaline pegmatite within the non-rusty mafic volcanic (hbld schist) contained beryl crystals from 3/4 cm to 4 cm width, and 1 to 3 cm long, light green porcelaneous colour, to yellowish colour--beryl crystals assoc with Kspar, musc--vein extends for several metres, but beryls only in 3 m section near widest part (~25 cm)	#3	Aug 8/03
03--49	519613	5518336	519616	5518316	Stop 2:	mafic volcanic with tourmaline development--rusy sample from contact with beryl vein	#3	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--50	519613	5518336	519608	5518334	Stop 2: from beryl vein	small piece from Kspar veinlet containing beryl crystals in sample 03--48--sample contains some subhedral beryl crystals	#3	Aug 8/03
03--51	519605	5518361	519642	5518352	Stop 3: large OC north of ATV trail--sample from east end of OC	the mafic volcanic (hbld schist) consists of foliated and lineated hbld crystals with interstitial feldspar. Towards the eastern end, tourmaline within the schist increases, creating a knobby or clotted appearance--also massive tourmaline-qtz veins cut this rock. Sample consists of two pieces of tourmaline-rich hbld schist, including the wx surface	#3	Aug 8/03
03--52	519619	5518389	519584	5518369	Stop 3: near north end, in the peg granite part	Sample of uniform, med gr, granite--feldspar, qtz, fine-gr tourmaline and pink gt, some yellow mica, but not a lot in this section, pinkish overall colour, maybe some grey-green albite	#3	Aug 8/03
03--53	519323	5518289	519288	5518264	Stop 5: large white OC just south of ATV road near junction	two pieces of granite showing different textures--rock contains a variety of the textures found in this granite: v c gr Kspar, with tourmaline in marginal areas, yellow mica pockets, banded diatexite, and some aplite with red garnets--	#3	Aug 8/03
03--54	519261	5518140	519273	5518146	Stop 8: OC at south ridge, just above south ATV trail--good view of lake	Most of OC ridge is schist, but the area from Stop 5 to ridge is intercalated peg granite and schist--either as lenses or rafts of schist in granite. Ridge consists of schist on top, with a band of peg along top south facing edge, and more schist exposed down slope--very steep, vertical drop of 30 feet or more. Two pieces of the hbld-biot schist.	#3	Aug 8/03
Aug-05								

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--55	519267	5518018	519249	5518013	low ridges in bush trending 110--come to ATV trail at curve	fn gr, banded, but not gneissic, foliated, uniform grain size, qtz-feld-biot schist--pinky brown on wx surface	#3	Aug 8/03
03--56	519292	5518044	519264	5518050	OC consists of alternating zones of musc schist and biot schist--musc schist is crenulated, brown colour--thin unit of chlorite schist noted in one location	samples of muscovite schist and biot schist from tree root exposure	#3	Aug 8/03
03--57	519292	5518044	519259	5518047	Same OC as 03--56	sample of chlorite schist--quite different than musc schist	#3	Aug 8/03
03--58	519313	5518046	519334	5518093	low OC immediately south of large ridge--alternating bands of well-crenulated musc schist (lenses of chlorite schist) and bands of the pinky-brown biot-qtz schist	sample of crenulated musc schist	#3	Aug 8/03
Aug-06								
03--59	519612	5518342	519617	5518323	Sanmine main zone	sample of pyrite rich quartz zone--for Au analysis	#4	Aug 8/03
03--60	519449	5518265	519431	5518255	Stop 6: low OC in bush, chlorite schist plus fn gr amphibolite	sample of chlorite schist and hbld schist	#4	Aug 8/03
03--61	519405	5518278	519388	5518269	Stop 7: round flat OC of peg granite in bush, just south-west of stop 6.	sample of peg with blue apatite	#4	Aug 8/03
03--62	519426	5518150	519406	5518145	Stop 8: low ridge along bike trail--amphibolite with large incl of pink Kspar rich pegmatite	tourmalinized amphibolite from near rusty zone	#4	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03--63	519426	5518150	519398	5518140	Kspar rich pink peg with blue apatite--casts of apatite on wx surface	two samples, both with crystals of blue apatite	#4	Aug 8/03
03--64	519390	5518122	519366	5518129	Stop 9: rounded ridge about 30 m north of main OC ridge,and about 30 m wide--wx brown with spots (garnets), non-foliated	rock consists of felted mass of bladed mineral, with green "eyes" of what may have been or still is olivine, very dense, soft--soapstone?	#4	Aug 8/03
03--65	519390	5518122	519410	5518109	Stop 9: high ridge south of the "soapstone" ridge	tourmalinized amphibolite from near rusty zone	#4	Aug 8/03
Aug-07								
03--66	519548	5518087	519545	5518082	Stop 1: on walk into showing, just at the "break in slope" part of the ridge, just above the Zealand seds	finely foliated, hbld-plag, about 25% plag, lenses of gt and epidote, also a light-coloured, slightly fibrous mineral-actinolite or anthophyllite?	#4	Aug 8/03
Detailed Mapping--see map for locations								
03--67	stop 1		0	0	at BL 0+00 and L0+00	crenulated mica (muscovite) schist, rusty brown to gold, and very friable, tourmaline development, also knots of a greenish, prismatic mineral	#4	Aug 8/03
03--68	stop 3		-1.286	-6.164		chlorite schist, green to brown, very soft, felted texture, local tourmaline development, seems to be stratigraphically above the biotite schist--very fine green chlorite, some biotite, and some biotite clots	#4	Aug 8/03
03--69	stop 4		-1.534	-5.446		biotite schist, crenulated, appears "draped" over and around the pegmatite, v c gr.,	#4	Aug 8/03
03--70	stop 5		-4.293	-3.953		general pegmatite samples from west wall of showing--peg with tourmaline	#4	Aug 8/03

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
03–71	stop 6		-9.44	-7.81		ridge of brown-green rock with mica books exposed on surface--rock is olive green-grey, fn gr, felted texture composed of sugary patches of olive green mineral (olivine?), and grey transparent lath-shaped crystals (actin or anthoph?)	#4	Aug 8/03
Aug-08								
03–72	stop 7		-4.89	-9.003		small OC of chlorite schist in middle of showing area--sample of chlorite schist	#4	Aug 8/03
03–73	stop 7		-4.887	-8.475		biotite selvedge at north edge of chlorite, between chlorite and peg	#4	Aug 8/03
03–74	stop 8		-6.337	-5.095		peg along west wall of showing, with smears of biotite schist --samples of peg, with some blue apatite, to illustrate texture	#4	Aug 8/03
03–75	stop 10		-6.093	-10.398		peg south of chlorite, with 10 cm wide selvedge zone of oriented large tourmaline--lumpy qtz stained yellow, some rusty mineral, not magnetic, also tourmaline oriented around large Kspar crystals--sample of selvedge with apatite and pink garnet	#4	Aug 8/03
Samples from 2004 mapping								
Regional Mapping								
04-04	520019	5518015	520025	5518007	WP 178--on edge of bush from lower part of southern ridge--small OC of UM in contact with metavolcanic and pegmatite.	Sample of UM--med-grained, felted, consists of talc-chlorite, grey-green on fresh surface, weathers brown.	Rock Samples	June 21-04
Detailed Mapping								

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
04-01			0.401	-2.509	Near BL and line 0--former outcrop of the crenulated micaceous schist	Geen-coloured, crenulated micaceous schist (phlogopite evident on cleavage surfaces)--consists of talc, chlorite, and mica, some sulphides, but not magnetic--tiny, glossy black needles, tourmaline?	Rock Samples	June 21-04
04-02			-3.555	-2.582	Contact between UM and pegmatite, near top of the showing (stripped area).	Sample of course tourmaline, growing perpendicular to the contact with the UM	Rock Samples	June 21-04
04-03			0.44	-3.213	In the rusty metavolcanics, near top of stripped area, where the metavol are folded--very rusty and magnetic.	Sample of more siliceous band--very rusty, fine-grained, siliceous rock containing ~2-5% pyrite and perhaps pyrrhotite.	Rock Samples	June 21-04
04-05			-19.01	-0.92	Near north-west corner of exposed stripped part of showing, where the UM outcrop is in contact with the pegmatite.	Sample of the UM from the main outcrop.	Rock Samples	June 21-04
04-06			-15.1	-0.68	In the contact area between the two arms of the pegmatite--the tourmalinated, chlorite-actinolite schist.	Sample from near to northern part of this unit, with lots of tiny brown, glossy tourmaline crystals.	Rock Samples	June 21-04
04-07			-17.18	-2.39	From the same area as 05 and 06--sample of pegmatite.	Sample of feldspar-tourmaline pegmatite, with blue apatite.	Rock Samples	June 21-04
04-08			-8.98	-6.98	From the eastern edge of the chlorite schist, where it is in contact with the main pegmatite.	Sample of the grey-green chlorite-mica schist.	Rock Samples	June 21-04
04-09			-3.45	-7.32	Main part of showing--main exposure of biotite schist.	Biotite schist.	Rock Samples	June 21-04

Number	Easting	Northing	Easting (from map)	Northing (from map)	Location	Description	Pail Number	Shipped/Date
04-10			-1.086	-5.254	Samples 10-16 are from channel sample (chipped, not sawn, due to saw failure) across emerald-bearing zone.	This sample is from the E end, consisting of rusty, tourmalinized chlorite-biotite schist.		
04-11			-1.518	-4.938	Sampling occurred from East to West across zone.	Rusty chlorite-biotite schist with tourmaline.		
04-12			-1.882	-4.173		Rusty chorite-biotite schist, in contact with but above the biotite-phlogopite crenulated schist, which is not rusty.		
04-13			-2.88	-4.149		Crenulated biotite schist on the hanging wall of the emerald-bearing zone.		
04-14			-3.572	-3.795		Mixed pegmatite-biotite schist zone--this zone contains the emeralds. Also contains a characteristic and unusual blue-coloured albite.		
04-15			-4.2	-3.48		Edge of pegmatite, at contact with the mixing zone--here the pegmatite is distinctive orange and black in colour and quite friable.		
04-16			-4.619	-2.843		Pegmatite from 1 m above the contact with the mixed zone--still orange and black, but much more competent.		

Mary I. Garland

420 Wilkins Street
London, Ontario N6C 5B2
Tel: 519 649 1906
Email: mgarland@allstream.net

CERTIFICATE of AUTHOR

1. I am currently employed as a consultant and work for myself.
2. I graduated with a degree in mineralogy, Doctor of Philosophy, from the University of Toronto in 2002. In addition, I have obtained Fellow of the Gemmological Association of Great Britain in 1997, and Fellow of the Canadian Gemmological Association, in 1997.
3. I am a fellow of the Association of Professional Geoscientists of Ontario; fellow of the Geological Association of Canada; fellow of the Gemmological Association of Great Britain; and fellow of the Canadian Gemmological Association.
4. I have worked as a geologist for a total of 28 years since my graduation from university.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
6. I am responsible for the preparation of the field geology section and the two geological maps of Technical Report titled the Dryden Emerald Occurrence, Taylor Pegmatite and dated September 27, 2004, relating to the Dryden Emerald Property. I visited the Dryden Emerald Property in July and August of 2003 for 20 days and June of 2004 for 21 days.

2.29541

7. I have not had prior involvement with the property that is the subject of the Technical Report.

8. I am independent of the issuer applying all of the tests in section 1.5 of NI 43-101.

9. I have read NI 43-101 and Form 43-101F and this Technical Report has been prepared in compliance with that instrument and form.

10. I consent to the filing of this Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this twenty-seventh day of September, 2004.

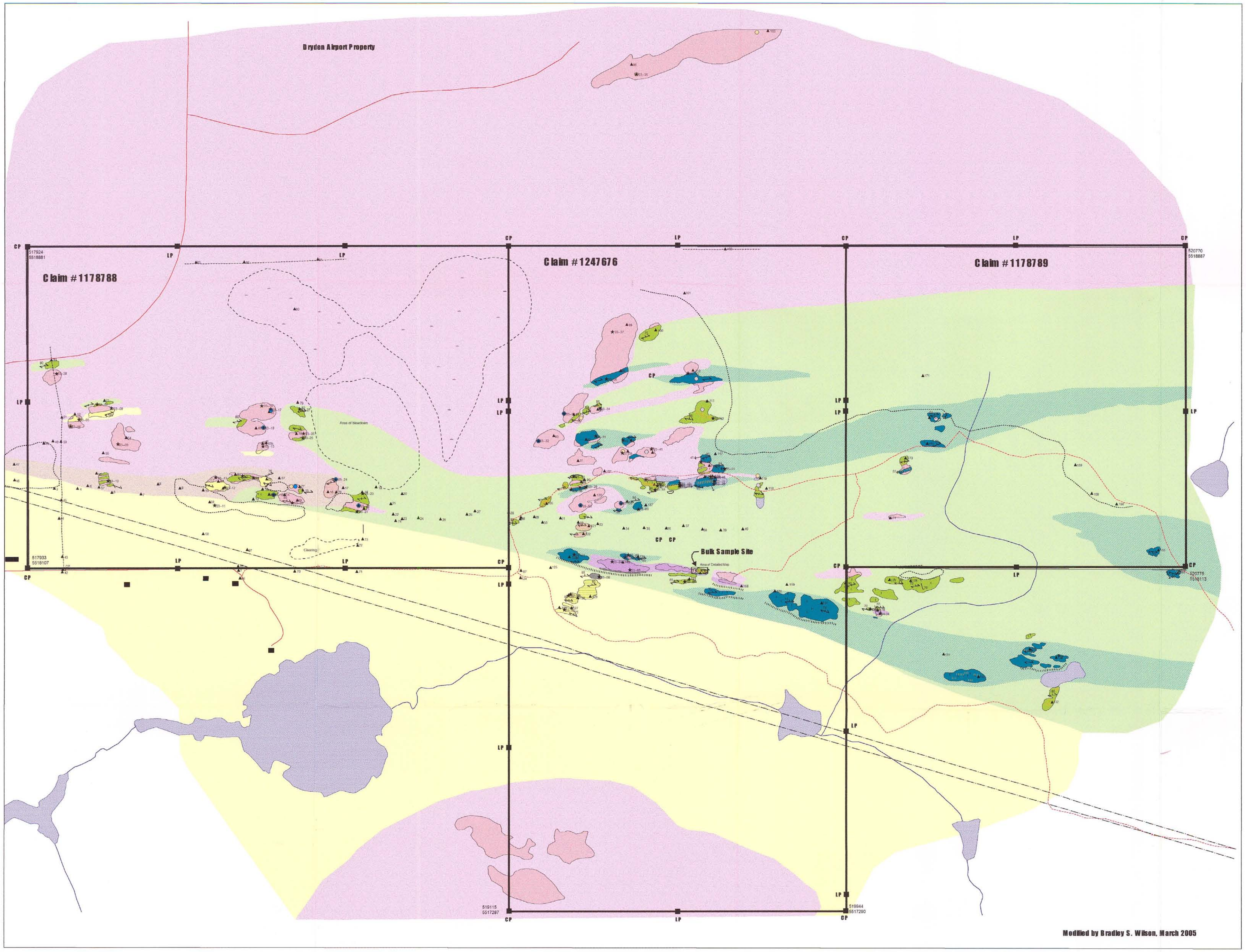
M Garland

Signature of Qualified Person

MARY I. GARLAND

Print Name of Qualified Person

PROFESSIONAL GEOSCIENTIST
MARY I. GARLAND
PRACTISING MEMBER
0583
ONTARIO



Legend

Lithologies

Interpreted exposure/outcrop

- Unit 1a--altered ultramafic (peridotite)
- Unit 2a--felsic metavolcanic, consisting of quartz-biotite schist to quartz-feldspar-biotite schist
- Unit 2b--intermediate to mafic metavolcanic, consisting of biotite schist to biotite-hornblende schist
- Unit 2c--mafic metavolcanic, consisting of amphibolite schist to massive amphibolite with little foliation
- Ghost Lake granite and derived pegmatites
- Area of biotite schist (2b) mixed with pegmatites on scale too fine to differentiate
- Mixture of quartz-feldspar-biotite schist (unit 2a) and biotite schist (unit 2b)
- Chlorite schist
- Muscovite schist
- Geological contact-observed; No line-inferred
- Zones of intense rust development
- ttt Tourmaline development

Structure

- Foliation-dip unknown
- Foliation with dip
- Foliation, vertical dip
- Lineation, trend and plunge
- Joints, cleavage, vertical dip
- Joints, cleavage, with dip
- Structural trend/folds
- Pillows, showing direction of tops

Topography

- Lake/river-stream
- Cliff/steep slope
- Roads (paved or gravel)
- Trails (suitable for ATV)
- Fence
- Flagged or cut lines
- Swamp
- Clearing, area of blow-down
- Boulder fields, moraine
- Building
- CP Claim post

Sample Information

- ▲ 103 Traverse way point (from GPS coordinates)
- ★ 03-21 Sample location and number
- Apatite noted in outcrop
- Beryl noted in outcrop
- Diopside and epidote alteration noted in outcrop

N

Magnetic declination 0° 23' E, 2004

Map topographical base is derived from the Ontario government 1997 airphotos, FL 4927-A, numbers 58-195 and 58-196.
GPS coordinates are based on the UTM grid Nad 83, zone 15

Credits

2.295 41

Geology by M.I. Garland and assistants (A. Brand and D. Kellett), 2003 and 2004.

The geology south of the power line is interpreted from the following geological studies of the area:
Satterly, J., 1941: Geology of the Dryden-Wabigoon Area; Ontario Department of Mines Fiftieth Annual Report, L, II, Map 50c.

Breaks, F.W. and Kuehner, S., 1984: Precambrian geology of the Eagle River-Ghost Lake area, Kenora District, Ontario Geological Survey Map P. 2623.

Zealand Township, Kenora Mining District

Dryden Emerald Occurrence
Regional Geology Map
True North Gems Incorporated

Author: M.I. Garland, P. Geo.
Field assistants: A. Brand (2003)
and D. Kellett (2004)

Date:1/9/2004

Scale: ~~1:2000~~ | Projection: UTM Zone 15 (NAD 83)

0 25 50 100
metres

Bulk Sample Report

for

Claim # 1247676,

Zealand Township, S ½ Lot 17 Con 8, and N ½ Lot 17 Con 7,

Dryden, Ontario

for

True North Gems

Suite 500, 602 West Hastings St.,

Vancouver, BC, V6B 1P2

604-687-8055

By

Bonnie Pemberton (True North Gems, Vancouver, BC)

and

Bradley S. Wilson (registered claim owner)

Bulk Sample taken June 9, 2004 through June 22, 2004.

Report written in February and March 2005.

In June 2004, True North Gems arranged for a 0.972 tonne mini-bulk sample to be taken from its Ghost Lake property near Dryden, Ontario. The purpose of this sample was to determine 1) the grade of emerald, determined in grams per tonne, and 2) the quality grade of emerald, also calculated in grams per tonne. The quality grade is determined by separating emerald into gem, near-gem, and non-gem fractions. Gem quality material is considered to be transparent, near-gem emerald is translucent, and non-gem quality is opaque. Gem and near-gem material can be used as faceted stones, cabochons, and beads in jewellery. Non-gem is generally considered unusable. The results of the sample would indicate to True North if the quality grades were high enough to justify further exploration and possible mining.

Another purpose of this year's fieldwork was to determine the extent of mineralized rock, and to find additional occurrences of emerald on other areas of the property.

The 0.972 tonne mini-bulk sample was split into two shipments, one of which went to Kennecott Labs in Thunder Bay (0.7334 tonnes), and the second to True North's lab in Vancouver (0.2386 tonnes). In the field the sample was split into two portions, one portion being of a higher visual grade than the other. One half of the higher-grade portion was sent to Vancouver while the other half along with the lower-grade material was sent to Thunder Bay.

Upon receiving the mini-bulk sample in our Vancouver lab, the shipment was open and the contents inside examined. Of the material shipped, fewer than 10 hand samples of the high-graded material were found to contain gem and near-gem emerald. Of the remainder, non-gem emerald was visible in nearly all the samples of the high-graded material.

In addition to collecting the mini-bulk sample at Ghost Lake, geologic mapping and prospecting occurred. Unfortunately, emerald was not found at any location other than at the mini-bulk sample site.

The combination of poor visual emerald grades and the lack of new emerald occurrences on the property led True North to believe that even if the emerald grade and quality was higher than it initially appears to be, the tonnage involved is too small to be worth mining. Consequently, plans to further process the bulk sample were discarded.

Currently 0.7334 tonnes remain in storage in Thunder Bay, and the remainder (0.2386 tonnes) is stored in True North's Vancouver offices.

The following section should act as a summary of this report and is a list of the information headings outlined in the original "Permission to Test Material" letter dated May 31, 2004.

<u>Tonnes Excavated and Tonnes Removed</u>

0.972 tonnes were excavated and removed (1,039.6 kg shipped less the weight of rock pails and hand samples for geochemistry – 67.6 kg for a total of 972 kg).

Tonnes Tested

The higher-grade 0.2386 tonne sample sent to True North's Vancouver office was visually examined for the presence of emerald. Fewer than 10 hand samples in this sample were found to contain gem and near-gem emerald. This combined with the failure of the mapping program to locate additional emerald occurrences lead to the decision of not processing the sample by physical means to further liberate the emeralds contained within.

Location of Test Area

The test area in located on S ½ Lot 17 Con 8, and N ½ Lot 17 Con 7, Zealand Township, Dryden, Ontario. The precise location is nearly the very centre of Claim # 1247676 and is shown on the attached map.

Physical and Engineering Test Results

Physical and engineering tests were not performed on the bulk sample after True North Gems' determined that the disappointing results did not warrant further exploration expenditures.

Marketing and Market Testing

None performed.

Revenues from Sales

There were no sales.

Cost of Conducting the Bulk Sample and Evaluation

The estimated cost of conducting the bulk sample program is $24,357.07.

This estimate is based on the following logic. The total cost of the 2004 mapping and bulk sample program was $40,595.12 (including a rental charge for the diamond chainsaw of 15% of the purchase price or $522.68). The bulk sample program was the main focus of exploration in 2004 and its proportion of the time and money spent on the claims is estimated to be 60% or $24,357.07.

Surveyed Plans and Sections

None made.

Storage and Disposal or Future Intentions

Currently 0.7334 tonnes remain in storage in Thunder Bay, and the remainder (0.2386 tonnes) is stored in True North's Vancouver offices. Future plans for the sample are unclear at this point in time. A question regarding the sample's value was asked during a telephone conversation with staff from the Ministry of Northern Development and Mines. This question cannot be answered without liberating the emeralds from the host rock in the sample and than evaluating the emeralds produced. At this point, however, it seems very unlikely that the value of the emeralds contained in the sample would exceed the cost of extraction.

Rehabilitation Requirements

The site has been rehabilitated according to "Appendix A" of the original "Permission to Test Material" letter of May 31, 2004.

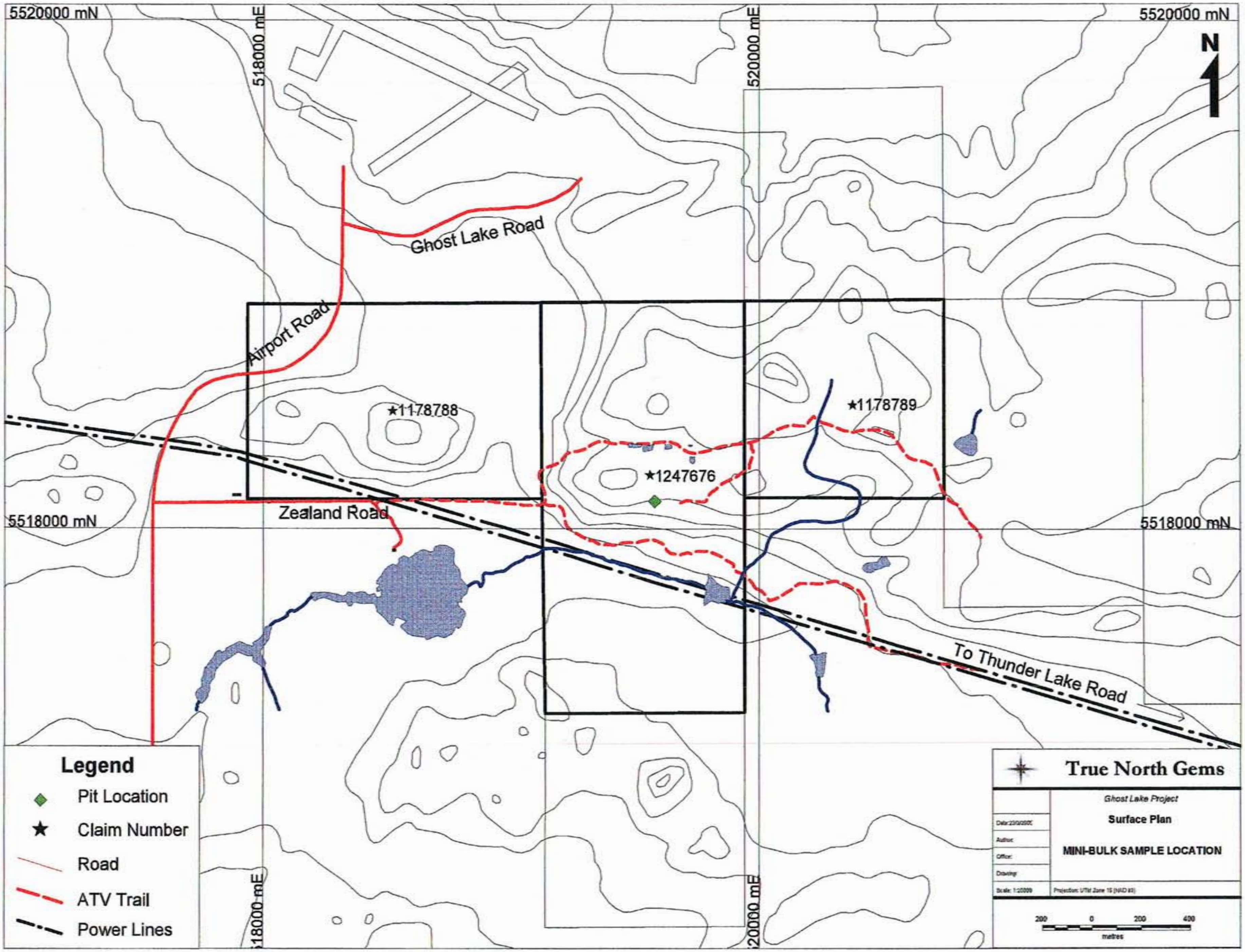
Signed, March 7, 2005

Bonnie Pemberton

Bonnie Pemberton for True North Gems

Brad Wilson

Brad Wilson



5520000 mN
518000 mE
520000 mE
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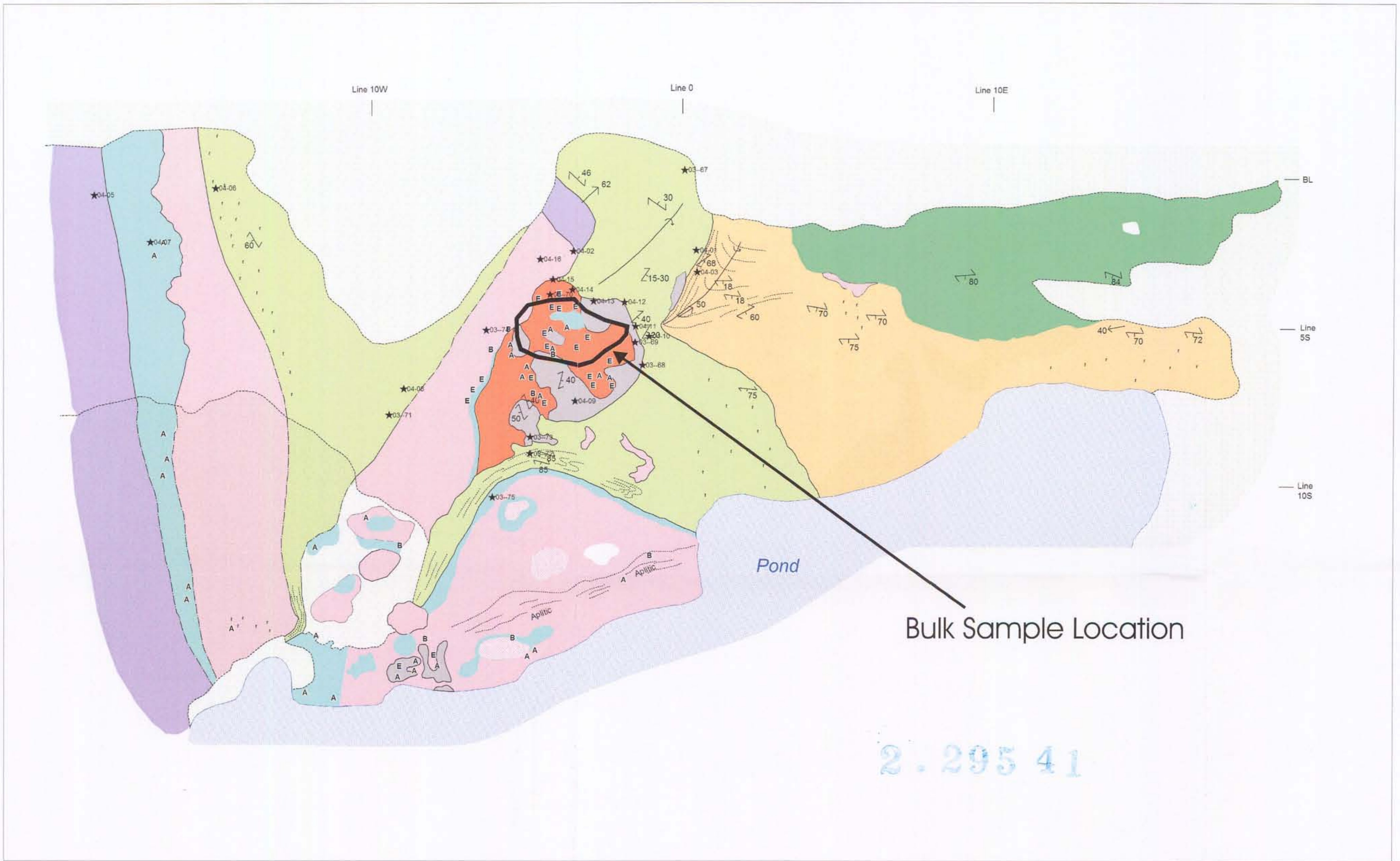
Ghost Lake Road
Airport Road
★1178788
★1247676
★1178789
Zealand Road
5518000 mN
5518000 mN
To Thunder Lake Road
518000 mE
520000 mE
Legend
Pit Location
Claim Number
Road
ATV Trail
Power Lines
True North Gems
Ghost Lake Project
Surface Plan
MINI-BULK SAMPLE LOCATION
Author:
Office:
Drawing:
Scale: 1:20000
200 0 200 400
metres



LEGEND

Lithology

- Metavolcanic rocks: biotite-feldspar to amphibole-biotite-feldspar schist
- Metavolcanic rocks with substantial rusting due to disseminated pyrite and pyrrhotite
- Altered peridotite
- Pegmatite-related to the Ghost Lake batholith
- Chlorite schist-predominately chlorite with some phlogopite
- Biotite schist
- Tourmaline-feldspar zones, characterized by large tourmaline crystals, interstitial feldspar and apatite
- Zone of mixing between the chlorite schist and the pegmatite, also the area of richest emerald development
- Large potassium feldspar crystals/quartz pods
- Areas obscured by grass, brush, disturbed ground or rock debris

Structure

- Geological contact
- Geological contact-inferred
- Structural trends (foliation, schistosity or banding)
- Strike and dip of foliation
- Trend and plunge of linear features
- Fold axis-antiform
- Fold axis-synform

Mineralization

- E, A, B — Mineralization: emerald, apatite, beryl
- t — Zones of tourmalinization
- ★ 04-12 — Sample location

Dryden Emerald Occurrence
Detailed Geology Map
True North Gems Incorporated

Claim # 1247676
Modified by Bradley S. Wilson (March 2005)

Author: M.I. Garland, P. Geo.
Assisted by A. Brand and D. Kellett

Date 2/9/2004

Scale: 1:

Projection: Non-Earth (meters)

0 metres 8

N (True)

2.29541

ADDENDUM

(by Bradley S. Wilson, March 2005) Brad Wilson
to the report by
M.I. Garland, Sept 27, 2004 Mar 23/05
titled

"The Dryden Emerald Occurrence"

This addendum includes information required for this assessment report that was originally overlooked during the writing of the original geology report by M.I. Garland. The items covered include a statement of the number of days worked on the mineral claims, the dates worked and the personal who performed the work, the name and address of the claim owner, a list of Figures and Tables and a general location map.

Days Worked on the Ghost Lake Project, Dryden Ontario		
Personal	**Dates Worked on Project**	**Total Days Worked**
	2003	
Mary Garland	July 25 - Aug 8, 2003 - on site in Dryden	15
	August, 2003 - report writing	2
Allison Brand	July 25, 2003 - Aug 7, 2003 - on site in Dryden	14
Bradley Wilson	July 25, 2003 - on site in Dryden	1
	2004	
Mary Garland	June 10, 2004 - June 21, 2004 - on site in Dryden	12
	August & Sept, 2004 - report writing	7
Bradley Wilson	June 10, 2004 - June 21, 2004 - on site in Dryden	12
Dawn Kellett	June 10, 2004 - June 18, 2004 - on site in Dryden	9

Claim Owner

Bradley S. Wilson
P.O. Box 352,
Kingston, Ontario
K7L 4W2
613-549-3728

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Location Map
showing the three (3) mining claims referred to this report.