

with accessory *ZIRCON* show lamination in the calcsilicate rock. The *SULFIDES* show a laminated *PYRRHOTITE* network with semi-massive *PYRITE* blebs, veins and layers with lower sulfide content. *CHALCOPYRITE* specks are present locally. *CHLORITE* constitutes about 40% of the rock in the schists of the upper part of this unit. *OLIGOCLASE* and *CORDIERITE* poikiloblasts appear with *REDDISH-BROWN BIOTITE* \pm *TOURMALINE* in schist and gneiss at a depth of about 750'. The arkose and arenite, with intergranular *ALKALIFELDSPAR*, tend to decrease in volume down-hole and are replaced by veins with *CORDIERITE* pseudomorphs exhibiting both conformable and cross-cutting relationships to layering. These veins are conformable with respect to foliation of the surrounding metasediments.

837'-1003' T.D. Biotite-chlorite gneiss, biotite schist and metawacke.

This unit consists of intercalated arkosic, *TOURMALINE* bearing, fine-grained biotite-chlorite gneiss, biotite schist, and metawacke with *GROSSULARITE* bearing calcsilicate, metavolcanic and *KAOLINITE* (894'-895.3') (X-Ray Diffraction) components. Cataclastic intervals and joints cemented with *LAUMONITE* (X-Ray Diffraction) occur from 822.60' downwards. *PLAGIOCLASE*, *ALKALIFELDSPAR* and *CHLORITE* content varies across layering with the colour of *BIOTITE* ranges from green-brown to red-brown. *TOURMALINE* and *ZIRCON* are present as accessories. Two directions of foliation are present, one parallels layering, the other crosscuts it. *GROSSULARITE*-bearing calcsilicate inclusions are observed in *QUARTZ* veins. These are associated with metavolcanics and are reflected by *CHLORITE* + *SERICITE* + *ALBITE* + *SECONDARY AMPHIBOLE INTERCALATIONS*.

The layering of the intrusive rocks in the upper 166' makes an angle of 20-45° to the core axis, and the angle of the metasediments to the core axis varies from 0-70°.

Acid Test Results

Footage	Angle from Horizontal
133'	58°
300'	58°
500'	58°
700'	58°
900'	56.5°

Notes: A detailed graphic log is available for study. Nine thin and forty-one polished thin sections were made from this drill hole. A total number of 83 rock samples was chemically analyzed. Analytical results follow in Table FHL-1.

CONDENSED GEOLOGIC LOG FOR DDH NR-1

The hole was drilled at an angle of 52° and an azimuth of 40°.

0'-224' Overburden.

224'-298.6' Weakly laminated oxide and olivine-bearing gabbro containing plagioclase-rich and plagioclase-olivine lenses, and olivine graded layering.

298.6'-406.3' Similar to above but with intercalations of oxide gabbro making up about 39% and oxide-rich gabbro making up about 15% of the section. 298.6'-311', 325.5'-337.9', 350'-352', 378.3'-383.4', 395.6'-406.3', oxide gabbros. 353'-368.8' and 379.8'-380.5' are oxide-rich gabbro, assaying 1650 ppm V. 391.7'-395.6', mesocratic oxide-bearing gabbro.

406.3'-496.3' Olivine and oxide-bearing gabbro with intercalations of 409.4'-417.8', 459'-461.8' mesocratic olivine and oxide-bearing gabbro, and 455.3'-458.2', 480.5'-486.3' tonalite and fine-grained granite veins. At 464.6' a fault occurs with quartz filling.

496.3'-585' Olivine and oxide-bearing gabbro with intercalations of olivine-bearing oxide gabbro making up about 42% of the section and mesocratic oxide-bearing gabbro. 496'-496.9', 502'-510.7', 513'-514.3', 540.4'-541.4', 542.3'-544', 553.6'-556.5', 556.8'-564.7', 565'-568.3', 570'-572.3', 577.4'-585', intercalations of olivine-bearing oxide gabbro. An intercalation of layered(?) to massive fine-grained diorite-gabbro is found at 544'-553', with amphibole-bearing coarse-grained plagioclase lenses digesting oxide gabbro at 544.4'-545.3', 573'-575' and 581'-581.8'.

585'-647' Olivine and oxide-bearing gabbro with intercalations of amphibole-bearing granite veins and dikes up to 0.3' thick.

647'-706' Layered sequence of mainly oxide-bearing gabbro and mesocratic oxide-bearing gabbro with intercalations of oxide gabbro, making up about 43% of the section. 704.3'-705.3', intercalation of oxide-rich gabbro, assaying 3600 ppm V, making up about 1.7% of this section.

706'-807.8' Mainly oxide and olivine-bearing gabbro with graded layering of olivine and intercalations of mesocratic oxide-bearing gabbro at 711.8'-717', 718'-721', 725.3'-726', 779.6'-781.3'. Olivine-bearing oxide gabbro, making up about 7% of the section, is found at 751.7'-757.6' and 768.9'-769.9'. Amphibole-bearing joints occur at 707.7'-708.1', 744'-745', 756'-758.5', 759.4'-760' and 773'-774'.

807.8'-827' Interlayered sequence of olivine-bearing oxide gabbro and olivine and oxide-bearing gabbro. The oxide gabbro makes up about 53% of the section, and assays 2400 ppm V at 816.8'-818.8'.

827'-892.6' Olivine and oxide-bearing gabbro, with cataclastic zone having secondary Fe-Mg hydrosilicates and quartz veining at 842.3'-871.5'.

892.6'-910.4' Alternating layers of olivine and oxide-bearing gabbro and olivine-bearing oxide gabbro. The latter makes up about 39% of this section and assays 1700 ppm V, 300 ppb Pd and 150 ppb Pt at 901.8'-903.8'.

910.4'-953' T.D. Mainly mesocratic gabbro with graded layering of olivine. Intercalation of cataclastic and brecciated epi-metamorphic zones showing growth of pink feldspar, secondary Fe-Mg hydrosilicates, quartz veins and granitized zones are found at 925.6'-947'.

The foliation makes an angle of 70-80° to the core axis. The felsic veins and dikes make angles of 20-80° to the core axis with a tendency toward smaller angles at the lower part of the section.

PETROGRAPHY DDH NR-1

The vast majority of the laminated melanocratic rocks found in this drill hole are medium-grained weakly magnetic olivine and oxide-bearing gabbros, with conformable plagioclase-rich lenses. Lamination is caused by parallel orientation of plagioclase prisms and tablets. The average mineral composition of these rocks is 50-60% plagioclase, 30% clinopyroxene, 0-3% olivine and 7-15% oxide, with traces of chalcopyrite. The olivine content seems to reflect a crude layering which disappears near the top of the layers. Mesocratic varieties are frequently non-olivine bearing and have a thickness of up to about 30'.

Weakly layered olivine-bearing oxide gabbro members occur as intercalations up to 13' thick and constitute about 13% of the rock. The lowermost contacts of the members are sharp and coincide with reappearance of olivine. The uppermost contacts are gradational. The average mineralogical composition of these rocks is 25-45% plagioclase, 30-55% clinopyroxene, 2-5% olivine and 20-25% oxide.

Strongly magnetic oxide-rich varieties are closely associated with oxide gabbro found at the base, or as intercalations, with a thickness varying from 0.5 to 16' making up to 2.2% of the section. The average mineralogical composition of these rocks is 10-25% plagioclase, 30-45% clinopyroxene, 5-15% olivine and 35-40% oxide. The copper and vanadium content of these rocks assay respectively up to 1250 ppm and 3600 ppm at 704.3'-705.3'.

PLAGIOCLASE cumulus crystals are developed as prisms and tablets and may reflect compaction on **CLINOPYROXENE** cumulus crystals or clusters of finer grained crystals of **PLAGIOCLASE**, **OLIVINE** and **OXIDE** minerals. Compaction along larger **CLINOPYROXENE** cumulus crystals gives rise to deformation of plagioclase lamellae and breaking-up of crystals in sections made up by individuals showing acline simple twins following the (001) plane. The anorthite content varies from 40-55%, with a concentration of values around 50%, especially between 500 and 900'. The crystals are twinned following albite, Carlsbad and acline laws. Smaller, partly cumulus, subhedral to anhedral crystals occur as well, and have a ragged outline against **CLINOPYROXENE**. Purple-pink titaniferous **AUGITE** is found as anhedral, partly flattened larger crystals, within cumulus layering and as smaller equant clusters with **PLAGIOCLASE**, **OLIVINE** and **OXIDE**. The crystals are characterized by simple twinning and inclusions of reddish brown **BIOTITE**. Cumulus **OLIVINE** occurs as larger anhedral to subhedral slightly flattened crystals, paralleling lamination, as smaller equant cumulus crystals, and as rims on **MAGNETITE** in oxide-rich gabbros.

ORTHOPYROXENE is occasionally observed as relicts in **CLINOPYROXENE** having ragged outlines. Subhedral to equant **APATITE** may occur in certain layers as part of the cumulus assemblage. **ILMENITE**, the most frequently occurring **OXIDE** is partly surrounded by **MAGNETITE**. In the vanadium-rich variety, however, the **MAGNETITE-ILMENITE** ratio is 3:1. The **OXIDES** are intergrown with **CLINOPYROXENE** and enclose sinuous **PLAGIOCLASE** tablets and prisms in the oxide-rich varieties. **MAGNETITE** shows exsolution lamellae of **ILMENITE** following crystallographic directions and patterns of cracks, and may have inclusions of a variety of **SPINEL**. **CHALCOPYRITE**, in lamellar intergrowth with **BORNITE**, is mostly observed in oxide-rich gabbros as minute specks in **CLINOPYROXENE**, along the fringes in **ILMENITE**, and occasionally with **PYRITE** and **ARSENOPYRITE**(?). These rocks can be labeled as plagioclase-clinopyroxene-olivine cumulates with oxide postcumulus. Conformable and cross-cutting brown-green and deep blueish-green **AMPHIBOLE** bearing syenite, granophyric and granite veins with euhedral **APATITE** prisms are observed throughout the core. These felsic rocks alter the layered rock through growth of spherulitic **CHLORITE**, **EPIDOTE** in **PLAGIOCLASE** and replacement of **CLINOPYROXENE** by greenish **HORNBLende** and greenish **BIOTITE**. The very fine-grained to medium-grained alkali syenite has an **ALKALIFELDSPAR**, resembling that of syenite veins and intergranular feldspar of the clastic metasediments described in DDH FHL-1.

Acid Tests Results

Footage	Angle from Horizontal
233'	54 1/2°
533'	53°
833'	58°

Notes: Ten polished thin sections and one thin section were made. Ten core samples were assayed. A detailed graphic log is available for study. The analytical results follow in Table NR-1.

CONDENSED GEOLOGIC LOG FOR DDH NE-1

The hole was drilled at an angle of 50° and an azimuth of 210°.

0'-36' Overburden.

36'-191.9' Medium to coarse-grained laminated troctolitic anorthosite and anorthositic troctolite with evenly dispersed olivine concentrations up to 3 mm and plagioclase tablets of up to 0.1'. Olivine contents vary between 10 and 20% and define a crude layering. Troctolite is present in layers up to 6' thick. These layers have sharp upper and lower contacts. Olivine-rich segregations and Fe-Mg hydrosilicates occur as scattered lenses throughout the interval.

191.9'-210.6' Anorthosite with sharp upper and lower contacts.