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REPORT CMS 86/8/7

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SAMPLE NOS.:	383601 - 383613
SUBMITTED BY:	A.M. Hespe
WORK REQUESTED:	Petrology

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Mt. Charter DDH MC-14 Core Samples

Thirteen drill core samples (383601 - 383613) were received for petrographic study; thin-sections were prepared and are described in the attached table; stain tests for K-feldspar or carbonate were carried out as necessary on the offcuts.

Summary

Two of the rocks are fine carbonaceous sediments, the others are all igneous and include intrusive, extrusive and pyroclastic types.

Classification of the rocks is based on existing (and relict) textures/ structures, on preserved primary minerals, on interpretation of alteration assemblages, and preserved primary features, i.e. the same criteria outlined in David Cowan's report (CMS 86/7/24).

In the two carbonaceous shales, there are lithological differences unrelated to metamorphism; both are indurated and have conspicuous fine slaty cleavage or schistosity at a moderate angle to bedding, accentuated by the development of thin carbonaceous (?graphitic) streaks. There is no detectable effect of the dolerite on the upper shale unit; both rocks are incompetent, and carbonaceous matter is quite mobile (and very easily converted to subgraphite or graphite).

The composition of 383602 is distinctly different from that of 383601, and this is not explained by the effects of chilling; thus, the sill is either a multiple intrusion, or is differentiated, and needs further examination.

Some of the volcanic breccias (e.g. 383607, 383608) are difficult rocks, because of alteration; for instance, 383607 appears to be a polymict rock, in which fragments of different colours signify different rock types; 383608, however, appears to be a single rock type in which some fragments suffered a different type of alteration which affected their colour and so gave the appearance of different lithologies. In 383607, the pale brown patches are simply finely disseminated sphalerite in silicates, i.e. the sphalerite acts as a pigment.

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Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
383601 (T.S. 56400) 49.0m	Chloritised Meta-Dolerite. Stubby prismatic fresh augite crystals, pale chlorite pseudomorphs after orthopyroxene; interstitial labradorite laths, a few quartz patches (?primary).	Medium-grained, random, typical doleritic fabric. Good relict pyroxene textures.	Fine cloudy sphene, some with magnetite cores. Trace ?chromite. Apatite needles. Zeolite veinlets.	Fabric suggests a minor intrusive. Feldspar percentage very low, and rock tends towards an ultramafic, e.g. plagioclase-websterite.
383602 56.2 m	Dolerite. Euhedral crystals, clusters and some phenocrysts, of fresh augite; random laths of fresh labradorite; interstitial carbonate, chlorite. A few amygdales.	Slightly finer-grained than 383601, but still in dolerite range. No chill features as such.	Carbonate-chalcedony in amygdales. Minor fine-grained sphene. Rare chrome-spinel.	Much more feldspathic, with less chloritised orthopyroxene than 383601; also weakly amygdaloidal. Could be a multiple intrusion.
383603 65.6m	Indurated Carbonaceous Shale. Subparallel sericite-muscovite flakes, silt-sized angular quartz and carbonate grains, ultrafine siliceous, carbonaceous matrix; carbonaceous streaks.	Finely laminated, with slightly coarser layers. Weak, crenulated schistosity at 40° to bedding.	Stringers of small pyrite crystals. Cross-cutting carbonate veinlets. Poorly defined ?fossils.	Rock is well-indurated, but not noticeably metamorphosed. Micaceous character obscured by abundant carbonaceous matter.
383604 75.1m	Lithic-Crystal Tuff. Scattered larger fragments of trachyte, devitrified obsidian, felsite, in a mass of smaller, lithic grains, quartz and feldspar splinters, interstitial quartz, carbonate, sericite.	Fragments are irregular, angular, generally well-sorted. Bedding accentuated by stylolitic veins.	A few mudstone/shale fragments - still plastic when deposited. Carbonate veinlets.	Diagenetic alteration has obscured some details, but regarded as sub-aqueous tuff rather than volcanomict sandstone. A few pyrite-quartz fragments - ?vein material.
383605 92.8m	Coarse Lithic Tuff. Deformed, contorted, and stretched fragments of dark trachyte, felsite, obsidian, dark glass; a few crystal fragments of argillised feldspar, quartz; altered ash matrix.	Shapes of larger fragments, and streaky nature of matrix, suggest welding.	Later pryite clusters occur interstitially, and also preferentially in some fragments.	All the textural features support an ignimbritic origin, but alteration makes interpretation tentative.
383606 125.0m	Indurated Carbonaceous Shale. Faint, thin laminations of slightly coarser quartz grains and muscovite flakes; dominantly ultrafine carbonaceous clay with thin carbon streaks.	Definite fine, closely-spaced schistosity at 50° to bedding, defined by carbon streaks.	Ultrafine pyrite throughout, also coarser crystals.	Almost identical with 383603, but clastic micas generally much finer. Not known whether carbon is graphite in either rock.
383607 173.0 m	Volcanic Breccia. Large angular fragments of porphyritic quartz-andesite (quartz, plagioclase phenocrysts, fine andesine, chloritised glass) and trachyte. Conspicuous sphalerite.	Andesites are flow-lineated; trachytes have typical felted fabric. Fragments are in close contact.	Sphalerite as compact and disseminated masses (brown) with quartz, albite. Calcite veins, patches.	Too coarse to be properly interpreted in T.S. Definitely fragmental, with different rock types - either an agglomerate or a welded coarse pyroclastic.
383608 203.1m	Altered Andesite-Breccia. Occasional quartz and oligoclase phenocrysts in a mass of oligoclase laths; some areas are chloritised (glass matrix), others are silicified, albitised, carbonated.	Fabric is the same in all fragments, and may continue across fractures.	Patches of coarse albite-adularia with chlorite. Quartz-albite-sphalerite patches.	Classified as andesite because no evidence of primary ferromagnesians, and crystalline phase is dominantly plagioclase. Colour differences misleading.

CENTRAL MINERALOGICAL SERVICES

Sample No.	Rock Type - Composition	Fabric	Minor Minerals	Comments
383609 286.3m	Amygdaloidal, Porphyritic Basalt. Scattered phenocrysts of saussuritised plagioclase, fresh augite, in fine groundmass of the same minerals; irregular amygdales with chalcedony, carbonate.	Random fabric, with felted textures; reaction rims around inclusions.	Quartz xenocrysts with pyroxene reaction rims. Accessory magnetite. Fine pyrite throughout.	Pervasively altered, with saussuritisation of plagioclase, but not particularly silicified except for chalcedony (+ amorphous SiO_2) in amygdales.
383610 316.9 m	Basalt Lava-Breccia. Small phenocrysts of augite, silicified plagioclase, in groundmass of the same minerals; angular fragments of lavas with similar composition, different fabrics.	Good flow-lineation of host lava and of xenoliths. Some amygdales. Reaction rims. Some fracturing.	Quartz xenocrysts with pyroxene reaction rims. Quartz-prehnite in amygdales. Carbonate veins. Fine pyrite.	Fine, pale chlorite is responsible for colour. Rock is similar to 383609, but with xenoliths ("cognate"), with noticeably different fabric, generally more glassy
383611 431.4 m	Altered Basalt Breccia. Small plagioclase laths, carbonate pseudomorphs after pyroxene; occasional altered phenocrysts; amygdales. Bleached, chilled margins against chert infilling.	Flow-lineated; blocky fracturing. Evidence of plastic deformation. Some chert is vein-like.	Carbonate and quartz veins. Pyrite crystals in chert and basalt. Quartz xenocrysts.	Colour of altered rock much lighter due to carbonate and fine groundmass silicification. Possibly subaqueous brecciation (during ?flow), simultaneous chert deposition.
383612 473.4 m	Altered ?Basalt Breccia. Saussuritised plagioclase phenocrysts in groundmass of altered feldspar laths, carbonate pyroxene; interstitial, chloritised glass. A few irregular amygdales.	Very good flow-lineation in places. Fine devitrification textures. Blocky fracturing, rotation.	Quartz-carbonate-chlorite veins. Areas of fine silicification. Fine epidote patches. ?Chalcopyrite in veins.	Composition may have been andesitic rather than basaltic, but too altered. Brecciation appears tectonic. Rock contained much glass.
383613 (T.S. 56412) 489.8m	Amygdaloidal Andesite. Small oligoclase phenocrysts in a partly silicified groundmass of matted plagioclase laths, stubby chloritised ?pyroxene; scattered amygdales with quartz, adularia.	Uniform, fine matted fabric; very local flow features only, around phenocrysts.	Amygdales contain sphalerite, pyrite, chlorite, epidote, carbonate. Pyrite throughout rock.	Since phenocrysts are oligoclase, and ferromagnesians are not abundant, rock is classified as andesite; silicification (and fine zoisite) has lightened the colour.