

148-504B-239R-1 (Piece 9, 26–30 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 270

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|--------------------------|-----------|-------------|----------------------------|---|
| Olivine | 0 | 1 | 0.4–1.1 | | Equant, euhedral. | Mostly altered to talc. May occur in plagioclase glomerocrysts. |
| Plagioclase | 7 | 7 | 0.5–1.6 | | Euhedral, subhedral. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 42 | 42 | 0.1–0.5 | | Euhedral, subhedral laths. | |
| Clinopyroxene | 27 | 45 | 0.3–1.1 | | Anhedral, equant. | Subophitic-ophitic. |
| Oxides | 2 | 2 | 0.02–0.35 | | Subhedral, equant. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | Tr | Olivine. | | | | Surrounds relict olivine. Also in cracks in plagioclase. |
| Actinolite | 20 | Clinopyroxene. | | | | Mineralogy ranges from finely fibrous actinolite to actinolite/hornblende to hornblende. With actinolite. |
| Hornblende | Tr | Clinopyroxene. | | | | |
| Talc | 2 | Olivine. | | | | |
| Pyrite | Tr | Silicates and magnetite. | | | | 2 to 100 µm. |
| Hematite | Tr | Magnetite. | | | | Ilmenohematite(?) |
| Pyrrhotite | Tr | | | | | Inclusions in plagioclase. |
| Magnetite | Tr | Olivine. | | | | With talc. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Patch | 2 | | 1 | Actinolite. | Irregular. | Actinolite replaces everything except the plagioclase crystal cores within the patch. |

148-504B-239R-1 (Piece 14, 45–51 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 271

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|---------------------------------|-----------|-------------|--------------------------------|---|
| Olivine | 0 | 1 | 0.4–1.5 | | Euhedral, equant. | |
| Plagioclase | 3 | 3 | 0.4–1.8 | | Euhedral to subhedral laths. | |
| Spinel | Tr | Tr | 0.06 | Iron rich. | Anhedral, equant. | In plagioclase. |
| GROUNDMASS | | | | | | |
| Plagioclase | 39 | 42 | 0.1–0.4 | | Euhedral-anhedral. | Large grains are oikocrysts. |
| Clinopyroxene | 11 | 43 | 0.1–2.0 | | Anhedral. | |
| Olivine | 0 | 4 | 0.1–0.2 | | Euhedral to subhedral, equant. | |
| Magnetite | 2 | 4 | 0.03–0.25 | | Euhedral to subhedral, equant. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 3 | Olivine, cracks in plagioclase. | | | | Associated with minor quartz and in alteration halos. |
| Albite | 1 | Cracks in plagioclase. | | | | In alteration halos. |
| Actinolite | 41 | Clinopyroxene, rarely olivine. | | | | In alteration halo adjacent to vein, associated with quartz and chlorite. |
| Quartz | Tr | Olivine. | | | | Associated with chlorite. |
| Prehnite | Tr | Plagioclase. | | | | In alteration halo. |
| Laumontite | Tr | Vein. | | | | Interstitial to actinolite in vein. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | 0 | | | | | |

COMMENTS: One actinolite vein (2 to 3 mm wide), bifurcated in two places, contains interstitial laumontite. Alteration halo (5 mm wide) adjacent to this vein, where clinopyroxene is extensively replaced by actinolite and magnetite(?) dust. Large phenocryst cut by the main branch of the actinolite vein shows that the vein is extensional. Offset crystals indicate 0.5-mm offset on branch of large vein. Large actinolite vein appears to have reopened and filled with finer grained contorted actinolite. Mineral abundance in vein halo: 35% primary magmatic, 60% amphibole, 2% chlorite, 2% albite, 1% secondary opaque minerals. Outside of vein halo: 67% primary magmatic minerals, 28% amphibole, 5% chlorite.

148-504B-240R-1 (Piece 6, 16-27 cm)
 ROCK NAME: Moderately phyric plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Intergranular.

OBSERVER: IMS

WHERE SAMPLED: Unit 272

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--------------------|-----------|--------------|--------------------------------|---|
| Olivine | 1 | 2 | 0.4-1.0 | | Euhedral to subhedral, equant. | Partially altered to talc. |
| Plagioclase | 6 | 6 | 0.5-1.3 | | Euhedral to subhedral. | |
| Spinel | Tr | Tr | 0.1 | Chrome-rich. | Anhedral, equant. | Inclusions in plagioclase phenocrysts, red-brown. |
| GROUNDMASS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Plagioclase | 39 | 41 | 0.05-0.50 | | Euhedral, anhedral laths. | |
| Clinopyroxene | 29 | 44 | 0.1-1.0 | | Anhedral. | Large grains are oikocrysts. |
| Opaque minerals | 2 | 2 | 0.03-0.25 | | Euhedral to anhedral, equant. | |
| Olivine | 0 | 2 | 0.2 | | | |
| SECONDARY MINERALOGY | PERCENT PRESENT | REPLACING/ FILLING | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Talc | 4 | Olivine. | | | | Magnetite also present. |
| Actinolite | 19 | Interstitial. | | | | Glass in plagioclase. |
| Magnetite | Tr | Olivine. | | | | With talc. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|--------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

148-504B-240R-1 (Piece 9, 33-38 cm)
 ROCK NAME: Moderately phyric plagioclase diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Intergranular.

OBSERVER: IMS

WHERE SAMPLED: Unit 272

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------------|-------------|-------------------------------|--|
| Plagioclase | 7 | 7 | 0.4-0.8 | | Euhedral, subhedral. | Zoned. |
| Olivine | 0 | Tr | Less than 0.2%. | | | |
| GROUNDMASS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Plagioclase | 41 | 44 | 0.05-0.40 | | Euhedral to anhedral. | |
| Clinopyroxene | 21 | 47 | 0.1-1.0 | | Anhedral. | |
| Oxides | Tr | Tr | 0.02-0.28 | | Euhedral to anhedral, equant. | |
| SECONDARY MINERALOGY | PERCENT PRESENT | REPLACING/ FILLING | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Albite | 1 | | | | | |
| Actinolite | 30 | Clinopyroxene. | | | | |
| Talc | Tr | Olivine. | | | | |
| Ilmenite | Tr | | | | | |
| Pyrite | Tr | Titanomagnetite and silicates. | | | | With secondary magnetite and chlorite. |
| Chalcopyrite | Tr | Titanomagnetite and silicates. | | | | With titanomagnetite. |
| Pyrrhotite | Tr | Inclusions in plagioclase, interstitial with magnetite, 2-10 μm. | | | | Also interstitial. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|--------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Relatively abundant sulfides.

148-504B-240R-1 (Piece 14, 52–63 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 273

ROCK NAME: Moderately phyrlic olivine-plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPO- SITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|--------------------|--------------------------------------|--------------|------------------|-----------------------------------|---|
| Olivine | 0 | 6 | 0.4–3.0 | | Euhedral, equant. | |
| Plagioclase | 2 | 2 | 0.6–3.3 | | Euhedral, subhedral. | |
| Spinel | Tr | Tr | 0.03–0.13 | Chrome-rich. | Euhedral to subhedral, equant. | Fresh to symplectic replacement by magnetite. |
| GROUNDMASS | | | | | | |
| Plagioclase | 42 | 43 | 0.1–0.6 | | Euhedral to anhedral. | |
| Clinopyroxene | 19 | 36 | 0.1–2.0 | | Enhedral. | Equant oikocrysts. |
| Opaque minerals | 3 | 3 | 0.08–0.32 | | Euhedral to anhedral, equant. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 8 | Olivine, plagioclase, clinopyroxene. | | | | Associated with quartz, pyrite. |
| Albite | 3 | Plagioclase. | | | | Along cracks. |
| Actinolite | 23 | Interstitial, clinopyroxene. | | | | With chlorite. |
| Pyrite | Tr | Olivine, inclusions in plagioclase. | | | | Also interstitial. 1–300 µm. |
| Chalcopyrite | Tr | Olivine. | | | | Up to 0.3 mm. |
| VESICLES/ CAVITIES | | | | | | |
| | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

148-504B-240R-1 (Piece 21, 82–90 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 274

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPO- SITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|--------------------|--|--------------|-----------------------|--------------------------------|---|
| Olivine | 0 | 1 | 0.3–3.0 | | Euhedral, equant. | |
| Plagioclase | 4 | 4 | 0.4–1.6 | | Euhedral, subhedral. | |
| Spinel | Tr | Tr | 0.12 | Iron-chrome- rich. | Euhedral, equant. | Altered to magnetite in groundmass. |
| GROUNDMASS | | | | | | |
| Olivine | 0 | 4 | 0.2–0.3 | | Euhedral, equant. | |
| Plagioclase | 45 | 47 | 0.1–0.4 | | Euhedral, anhedral. | |
| Clinopyroxene | 1 | 44 | 0.1–0.2 | | Anhedral. | |
| Magnetite | 1 | 2 | 0.03–0.36 | | Euhedral, anhedral, equant. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 9 | Olivine, clinopyroxene. | | | | Also in cracks in plagioclase. Associated with opaque minerals and actinolite in altered olivine. |
| Albite | Tr | Plagioclase. | | | | Fine crosscutting veinlets in plagioclase. Associated with magnetite. |
| Epidote | Tr | Plagioclase. | | | | |
| Actinolite | 39 | Clinopyroxene and fine-grained plagioclase. | | | | Minor plagioclase replacement and along cracks in plagioclase. |
| Titanite | 1 | Olivine, clinopyroxene, and titanomagnetite. | | | | With chlorite after olivine and clinopyroxene and as microgranule clusters with magnetite. |
| Hematite | Tr | Titanomagnetite. | | | | Ilmenite also replaces magnetite. |
| Chalcopyrite | Tr | Plagioclase, interstitial. | | | | |
| Pyrite | Tr | Interstitial. | | | | |
| Prehnite | Tr | Plagioclase. | | | | Associated with epidote. |
| VESICLES/ CAVITIES | | | | | | |
| | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

COMMENTS: Two veins of fine actinolite fibers and large actinolitic hornblende. Clinopyroxene is replaced by fine actinolite fibers in the halos around veins. Mineral abundances in the halos are 47% primary silicate minerals, 48% actinolite, 4% chlorite, and 1% titanite. Outside of halos the mineral abundances are 59% primary silicate minerals, 27% actinolite, 13% chlorite, 1% of pyrite plus pyrite, and no titanite. Plagioclase and clinopyroxene contain numerous cracks, some filled with secondary minerals. Actinolite veins have large actinolitic hornblende crystals oriented normal or oblique to vein walls, but fine actinolite needles are randomly oriented and appear to overprint the actinolitic hornblende. Offset crystals across veins indicate pure extension.

148-504B-241R-1 (Piece 1, 0-4 cm)
 ROCK NAME: Highly phyrlic plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS WHERE SAMPLED: Unit 275.

| PRIMARY MINERALOGY | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------|-----------------|-------------------------|-----------|-------------|------------------------|---|
| PHENOCRYSTS | | | | | | |
| Olivine | 1 | 3 | 0.2-1 | | Euhedral. | |
| Plagioclase | 8 | 9 | 0.4-1.6 | | Euhedral to subhedral. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 41 | 43 | 0.1-4 | | Euhedral to anhedral. | |
| Pyroxene | 25 | 42 | 0.05-0.8 | | Anhedral. | |
| Opaque minerals | 2 | 2 | 0.03-0.25 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Clays(?) | <0.1 | Glass | | | | Included in large plagioclase. |
| Chlorite | 1 | Olivine, clinopyroxene. | | | | |
| Actinolite | 17 | Olivine, clinopyroxene. | | | | Fibrous crystals replace clinopyroxene, prismatic to acicular crystals replace olivine. |
| Quartz | Tr | Olivine (minor). | | | | |
| Talc | 2 | Olivine, partially. | | | | |
| Magnetite | 1 | Olivine, partially. | | | | |
| Sulfide | 2 | | | | | Pyrite (5-100 μm) replaces silicates, with chalcopyrite inclusions. Plagioclase contains inclusions of pyrrhotite and chalcopyrite. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-----------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: Fresh olivine is still preserved, but is partly altered to talc and magnetite. Glass inclusion in plagioclase is altered to amphibole and clay(?) mineral.

148-504B-241R-1 (Piece 5, 16-19 cm)
 ROCK NAME: Moderately phyrlic plagioclase diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS WHERE SAMPLED: Unit 276

| PRIMARY MINERALOGY | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------|-----------------|-----------------------|-----------|-------------|------------------------|---|
| PHENOCRYSTS | | | | | | |
| Plagioclase | 5 | 5 | 0.5-5 | | Euhedral to subhedral. | |
| Spinel | Tr | Tr | 0.04-0.08 | Cr-Fe-rich. | Euhedral. | Symplectic replacement and alteration to magnetite. |
| GROUNDMASS | | | | | | |
| Plagioclase | 47 | 50 | 0.1-5 | | Euhedral to anhedral. | At least 3% of plagioclase is altered. |
| Clinopyroxene | 5 | 42 | 0.1-1 | | Subhedral to anhedral. | At least 37% of clinopyroxene is altered. |
| Magnetite | 0 | 1 | 0.03-0.28 | | Euhedral to anhedral. | At least 0.4% of magnetite is altered. |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Albite | Tr | Plagioclase cracks. | | | | Local. |
| Actinolite | 43 | Clinopyroxene. | | | | Pervasive alteration of clinopyroxene. Plagioclase replaced in cracks. |
| Anorthite | Tr | Plagioclase. | | | | Very localized partial replacement of plagioclase laths near vein/cataclastic zone. |
| Pyrrhotite | Tr | | | | | Inclusions in plagioclase. |
| Chalcopyrite | Tr | | | | | Inclusions in plagioclase, interstitial. |
| Pyrite | Tr | | | | | Inclusions in plagioclase, interstitial, replacing silicate. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-----------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: Altered plagioclase, clinopyroxene, and magnetite comprise 8% of the rock; unspecified alteration products make up 8%. A network of thin (<0.07 mm) actinolite veins (irregular) cuts all minerals. One cataclastic zone (0.15 mm wide) occurs, and contains actinolite, hornblende, and plagioclase. Plagioclase grains are fresh to slightly altered. Vein actinolite is fine-grained and fibrous. Offset crystals indicate pure extension.

148-504B-241R-1 (Piece 6, 32-36 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 276.

ROCK NAME: Moderately phyrlic plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|----------------|------------------------|---|
| Plagioclase | 5 | 5 | 0.4-2 | | Euhedral to subhedral. | |
| Spinel | Tr | Tr | 0.02-0.15 | Cr to Fe rich. | Euhedral to anhedral. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 37 | 42 | 0.1-0.4 | | Euhedral to anhedral. | |
| Clinopyroxene | 3 | 41 | 0.1-1.5 | | Anhedral. | |
| Opaque minerals | 0 | 0.8 | | | | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 1 | Olivine. | | | | |
| Albite | 2 | Plagioclase cracks. | | | | Locally. |
| Epidote | Tr | Plagioclase. | | | | Subhedral epidote in cores of plagioclase (uncommon) and as veins in plagioclase. |
| Actinolite | 52 | Clinopyroxene. | | | | Clinopyroxene is pervasively altered to actinolite; some clinopyroxene remains. |
| Pyrite | Tr | Inclusions in plagioclase. | | | | |
| Chalcopyrite | Tr | Inclusions in plagioclase, interstitial. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: One elongated cataclastic zone (1.6 mm wide) contains all mineral "clasts." The zone grades into an actinolite vein and shows <1 mm displacement. Large actinolite crystals are bent near the zone. One actinolite veinlet (0.5 mm) parallels the cataclastic zone. The veinlet does not have a constant width and bifurcates into several veinlets that cross host minerals. Crystals offset by vein indicate no appreciable displacement along vein.

148-504B-241R-1 (Piece 15, 78-81 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 276

ROCK NAME: Moderately phyrlic olivine-plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|-------------------------------------|-----------|-------------|------------------------|---|
| Olivine | 0 | 1 | 0.7 | | Euhedral. | |
| Plagioclase | 4 | 4 | 1.0 | | Euhedral to subhedral. | Plagioclase is often broken and slightly altered along cracks. |
| Spinel | Tr | Tr | 0.15 | Iron rich. | Euhedral. | Rims altered to magnetite. |
| GROUNDMASS | | | | | | |
| Olivine | 0 | 5 | | | | |
| Plagioclase | 42 | 45 | 0.1-0.8 | | | |
| Clinopyroxene | 6 | 44 | 0.2-2.0 | | Anhedral. | |
| Magnetite | 0 | 1 | 0.02-0.28 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 7 | Olivine, plagioclase, interstitial. | | | | Along plagioclase cracks; associated with actinolite; occurs out of the patch. |
| Actinolite | 41 | Clinopyroxene, interstitial. | | | | Complete replacement of clinopyroxene in the patch; occurs along cracks in plagioclase. |
| Quartz | Tr | Olivine. | | | | Associated with chlorite. |
| Pyrite | Tr | Olivine. | | | | Associated with chlorite. |
| Anorthite | Tr | Plagioclase. | | | | Incomplete rims on plagioclase laths in vein halo. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | 0 | | | | | |

COMMENTS: Host rock: 62% magmatic minerals, 25% amphibole, 13% chlorite. Patch: 38% magmatic minerals, 58% amphibole, 1% opaque minerals, 2% anorthite chlorite. Veinlets (0.01 mm wide) in the dikelet are perpendicular or oblique to the dikelet edge. Actinolite vein (up to 1 mm wide) has some cataclasis and <1 mm displacement. Dikelet appears to have intruded into microfault.

SITE 504

148-504B-241R-1 (Piece 19, 105–108 cm)
 ROCK NAME: Moderately phyric plagioclase diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Porphyritic.

OBSERVER: IMS WHERE SAMPLED: Unit 276

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|------------------------------|-----------|----------------------|--|---|
| Olivine | 0 | Tr | 0.6–1.2 | | Equant. | |
| Plagioclase | 7 | 8 | 0.8–1.2 | | Euhedral to subhedral, equant, laths and plates. | |
| Spinel | Tr | Tr | 0.02–0.13 | Cr to Fe rich | Euhedral. | Mostly replaced by magnetite. |
| GROUNDMASS Plagioclase | 37 | 41 | 0.1–0.6 | | Euhedral to subhedral, laths and needles. | |
| Clinopyroxene | 7 | 44 | 0.2–1.0 | | Subhedral to anhedral. | |
| Opaque minerals | 1 | 1 | 0.02–0.35 | Magnetite, Ilmenite. | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 2 | Olivine. | | | | With actinolite/hornblende. |
| Actinolite | 45 | Clinopyroxene, interstitial. | | | | Most abundant secondary mineral. It grades into actinolitic hornblende. |
| Titanite | 1 | Magnetite. | | | | With ilmenite lamellae. |
| Albite | Tr | Plagioclase. | | | | Occurs as veinlets in plagioclase. |
| Pyrite | Tr | Magnetite. | | | | Inclusions in plagioclase. |
| Chalcopyrite | Tr | Replacing silicates. | | | | |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

148-504B-242R-1 (Piece 4, 12–16 cm)
 ROCK NAME: Moderately phyric plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS WHERE SAMPLED: Unit 277.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|------------------------------|-----------|-------------|--------------------------------------|--|
| Olivine | 0 | 1 | 0.2–1.0 | | Euhedral. | |
| Plagioclase | 2 | 2 | 0.6–1.6 | | Euhedral-subhedral. | |
| GROUNDMASS Plagioclase | 41 | 43 | 0.1–0.6 | | Euhedral-subhedral laths to needles. | |
| Clinopyroxene | 23 | 46 | 0.2–1.0 | | Anhedral. | Subophitic. |
| Opaque minerals | 0 | 1 | 0.02–0.27 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 2 | Olivine, plagioclase. | | | | Replaces olivine in association with quartz and minor actinolite. Two generations (orientations) of chlorite observed after olivine: an earlier rim and later altered relict core. Minor chlorite developed along cracks within plagioclase. |
| Actinolite | 32 | Clinopyroxene, interstitial. | | | | Zones of intense alteration are delineated by the pervasive development of actinolite. |
| Talc | Tr | Olivine. | | | | Commonly in association with fine-grained secondary magnetite. |
| Anorthite | Tr | Plagioclase. | | | | Very localized replacement of plagioclase rims within the more heavily altered portions of the section. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | | | | | | |

COMMENTS: Actinolite-rich veinlets occur both along grain margins and crosscut the wall rock minerals.

148-504B-242R-1 (Piece 9, 28–33 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 277

ROCK NAME: Moderately phyrlic olivine-plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPO- SITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|--------------------|--|--------------|------------------|------------------------------|---|
| Olivine | 0 | 2 | 0.7–2.0 | | Euhedral. | |
| Plagioclase | 1 | 1 | 0.2–0.5 | | Subhedral, plates to laths. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 47 | 48 | 0.05–0.2 | | Subhedral, laths to needles. | |
| Clinopyroxene | 16 | 46 | 0.2–1.5 | | Anhedral. | |
| Olivine | 0 | 1 | 0.1 | | | |
| Magnetite | 2 | 2 | 0.02–0.33 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 2 | Olivine, plagioclase, interstitial. | | | | Associated with minor actinolite. |
| Actinolite | 29 | Olivine, clinopyroxene. | | | | Clinopyroxene completely replaced in vein halo. Elsewhere, actinolite replaces interstitial material. |
| Talc | 2 | Olivine. | | | | |
| Anorthite | Tr | Plagioclase. | | | | Partial replacement of plagioclase in vein halo. |
| Albite | Tr | Plagioclase. | | | | |
| Sulfides | Tr | Interstitial, inclusions in plagioclase. | | | | Pyrite, pyrrhotite, chalcopyrite. |
| VESICLES/ CAVITIES | | | | | | |
| | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

COMMENTS: Vein (1 mm wide) of coarse actinolite with an alteration halo (2 to 3 mm wide) crosscuts thin section. The coarse-grained actinolite within the vein has grown with a fibrous habit both normal to and oblique to the vein margins. No secondary plagioclase developed outside the vein halo. Vein development appears to be purely extensional. Slickensided surfaces have poorly developed steps. No offset or minerals visible on these surfaces.

148-504B-244R-1 (Piece 2, 3–8 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 279

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Hypidiomorphic granular to subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPO- SITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|--------------------|------------------------------|--------------|------------------|-------------------------------|---|
| Olivine | 0 | 1 | 0.4–0.8 | | Euhedral. | Partly with fresh core. |
| Plagioclase | 2 | 2 | 0.5–0.75 | | Subhedral, equant to laths. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 43 | 43 | 0.1–0.5 | | Subhedral, laths and needles. | |
| Clinopyroxene | 21 | 51 | 0.02–0.1 | | Anhedral. | Sometimes in a branching fashion. |
| Magnetite | 5 | 5 | 0.02–0.2 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Actinolite | 28 | Clinopyroxene, interstitial. | | | | Associated with magnetite. |
| Talc | 1 | Olivine. | | | | Incomplete rims of plagioclase near veinlets. |
| Anorthite | Tr | Plagioclase. | | | | Inclusions in plagioclase, replacing silicates and magnetite. |
| Pyrite | Tr | | | | | Inclusions in plagioclase, replacing silicates and magnetite. |
| Chalcopyrite | Tr | | | | | |
| VESICLES/ CAVITIES | | | | | | |
| | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

COMMENTS: Multiple parallel actinolite veinlets (0 to 0.4 mm wide) are spaced 3 to 4 mm apart and have diffuse edges. Veinlets have formed by replacement of clinopyroxene, not along fractures.

148-504B-245R-1 (Piece 8, 21-24 cm)
 ROCK NAME: Sparsely phyrlic plagioclase diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS WHERE SAMPLED: Unit 280

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|---|-----------|-------------|-----------------------------|--|
| Plagioclase | 1 | 1 | 0.5-0.7 | | Subhedral, equant. | |
| GROUNDMASS Plagioclase | 40 | 40 | 0.1-0.5 | | Subhedral laths to needles. | |
| Clinopyroxene | 13 | 48 | 0.1-0.6 | | Equant euhedral oikocrysts. | |
| Magnetite | 3 | 7 | 0.02-0.34 | | | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | Tr | Vein. | | | | In thin amphibole-chlorite-titanite veins. |
| Actinolite | 42 | Vein and clinopyroxene. | | | | 30%-40% of clinopyroxene is altered to amphibole. Amphibole is also found in plagioclase cracks. |
| Titanite | 1 | Vein. | | | | Abundant very fine veinlets (0.1 mm) with chlorite and amphibole. |
| Pyrite | Tr | Interstitial, inclusions in plagioclase replaces silicates. | | | | |
| Pyrrhotite | Tr | Interstitial, inclusions in plagioclase. | | | | |
| Magnetite | Tr | | | | | With actinolite in altered clinopyroxene. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: Point count did not include veins. Amphibole + chlorite + titanite veins crosscut thicker (1 mm wide) amphibole vein. Section contains titanite lenses ranging from 0.02 mm to 0.08 mm in width and from 0.13 to 0.30 mm in length.

148-504B-245R-1 (Piece 13, 36-39 cm)
 ROCK NAME: Sparsely phyrlic plagioclase diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS WHERE SAMPLED: Unit 281

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|-----------------------------|-----------|-------------|------------------------------|--|
| Plagioclase | 1 | 1 | 0.3-0.5 | | Anhedral, equant. | 3% in chilled margin. Grain size in chilled margin is 0.05-0.55 mm. |
| GROUNDMASS Plagioclase | 37 | 41 | 0.05-0.25 | | Subhedral laths to needles. | |
| Clinopyroxene | 13 | 53 | 0.1-0.4 | | Anhedral, equant oikocrysts. | |
| Olivine | 3 | | | | | |
| Magnetite | 2 | 1.2 | 0.02-0.2 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | Tr | Olivine(?) or interstitial. | | | | Very rare. Also in plagioclase cracks and after interstitial material. |
| Actinolite | 47 | Clinopyroxene. | | | | |
| Magnetite | Tr | Clinopyroxene. | | | | |
| Anorthite | Tr | Plagioclase. | | | | With actinolite. Particularly near chilled margin. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | | | | | | None. |

COMMENTS: Point count does not include chilled margin. The contact between chilled margin and host diabase is marked by a 0.04-mm-wide vein of actinolite. The chilled margin also hosts nine 0.04-mm-wide actinolite veins with alteration halos wide (0.05 mm), which are in turn cut by three thinner actinolite veins without halos. A 0.16-mm-wide actinolite vein cuts from the host diabase into the chilled margin.

148-504B-245R-1 (Piece 14, 39–46 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 281

ROCK NAME: Highly phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|-------------------------|-----------|-------------|-----------------------------|-----------------------------|
| Olivine | Tr | 4 | 0.6–3.0 | | Euhedral. | Some relict cores. |
| Plagioclase | 6 | 6 | 0.3–0.75 | | Subhedral-anhedral. | Equant to platy shapes. |
| GROUNDMASS | | | | | | |
| Plagioclase | 31 | 38 | 0.05–0.25 | | Subhedral laths to needles. | |
| Clinopyroxene | 0 | 50 | 0.03–0.1 | | Anhedral. | |
| Magnetite | 2 | 2 | 0.01–0.08 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | Tr | Olivine. | | | | Associated with actinolite. |
| Actinolite | 52 | Clinopyroxene, olivine. | | | | |
| Magnetite | 9 | Clinopyroxene. | | | | |
| Titanite | Tr | Alteration patch. | | | | With actinolite. |
| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | None. | | | | | |

COMMENTS: Network of 0.1-mm-wide actinolite veins crosscuts some phenocrysts. Little or no extension is evident in these veins suggesting formation by replacement. Alteration patches made up of actinolite with minor titanite. One 1.2-mm-wide fracture near a large clinopyroxene at one edge of the thin section dies out rapidly. This and other fractures form the slickensided surfaces.

148-504B-246R-1 (Piece 8, 21–25 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 283.

ROCK NAME: Sparsely phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic, subophitic, intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|----------------------------|-----------|-------------|------------------------------|---|
| Olivine | 0 | 2 | 0.4–0.8 | | Subhedral to anhedral. | Completely altered. |
| Plagioclase | 2 | 2 | 0.5–0.7 | | Subhedral, equant or laths. | |
| Spinel | Tr | Tr | 0.05 | Fe Cr rich. | Anhedral. | Altered to magnetite on rims. |
| GROUNDMASS | | | | | | |
| Plagioclase | 40 | 46 | 0.6–0.7 | | Subhedral, laths to needles. | |
| Clinopyroxene | Tr | 48 | - | | Anhedral. | Relict outside vein alteration halo. |
| Magnetite | 2 | 2 | 0.02–0.25 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | Tr | Olivine and plagioclase. | | | | Also in plagioclase cracks with or without epidote. |
| Albite | Tr | Plagioclase. | | | | In cracks close to veins. |
| Epidote | Tr | Plagioclase, interstitial. | | | | In cracks as small grains. |
| Actinolite | 55 | Clinopyroxene and olivine. | | | | Also in plagioclase cracks. |
| Anorthite | Tr | Plagioclase. | | | | On rims of grains. |
| Titanite | 1 | Titanomagnetite. | | | | |
| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | None. | | | | | |

COMMENTS: Almost the entire thin section is an alteration halo. Three actinolite veins (0.2 to 0.8 mm wide) occur with 6-mm-wide alteration halos. Veins consist of very fine-grained fibrous actinolite that define a "foliation" subparallel to the vein. Veins end at "T" and "L" intersections.

148-504B-246R-1 (Piece 26, 91–94 cm)
 ROCK NAME: Sparsely phyric plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Seriate porphyritic, subophitic.

OBSERVER: IMS

WHERE SAMPLED: Unit 284.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|------------------------------|-----------|-------------|-----------------------------|-----------------------------|
| Olivine | 0 | 1 | 0.6–1.5 | | Euhedral, equant. | Completely altered. |
| Plagioclase | 1 | 1 | | | Subhedral, equant to platy. | |
| Spinel | Tr | Tr | 0.06–0.1 | Cr rich | Euhedral. | In plagioclase. |
| GROUNDMASS Plagioclase | 49 | 49 | 0.1–0.7 | | Subhedral, plates to laths. | |
| Clinopyroxene | 4 | 44 | 0.3–1.0 | | Anhedral oikocrysts. | |
| Olivine | 0 | 5 | | | | |
| Magnetite | 2 | 2 | 0.02–0.28 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 2 | Olivine and clinopyroxene. | | | | Also rarely in plagioclase. |
| Albite | 1 | Plagioclase. | | | | On fractures. |
| Actinolite | 41 | Clinopyroxene, interstitial. | | | | |
| Titanite | Tr | Olivine. | | | | With chlorite and quartz. |
| Quartz | Tr | Olivine. | | | | With chlorite and titanite. |

| VESICLES/ CAVITIES | PERCENT | LOCATI | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-----------------------|---------|--------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: An actinolite vein (0.7–0.8 mm wide), with 8-mm-wide halos, is cut by two later actinolite veins (0.4 mm wide) that merge. Several branching 0.02-mm-wide veinlets also occur in this thin section. The actinolite veins crosscut actinolite replacement of pyroxene in the groundmass. Fiber orientations within the veins suggest that the wider vein is purely extensional whereas the thinner vein probably has a small shear component.

148-504B-246R-1 (Piece 32, 111–115 cm)
 ROCK NAME: Moderately phyric plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS

WHERE SAMPLED: Unit 284.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|------------------------------|-----------|---------------------|-------------------------------|--|
| Olivine | 0 | 1 | 0.6–1.0 | | Euhedral, equant. | |
| Plagioclase | 2 | 2 | 0.6–1.8 | | Euhedral-subhedral, equant. | |
| Spinel | Tr | Tr | 0.03–0.12 | Cr rich to Fe rich. | Subhedral-anhedral magnetite. | In plagioclase and olivine. Altered to magnetite on rims. |
| GROUNDMASS Plagioclase | 49 | 49 | 0.1–0.6 | | Subhedral, laths to needles. | |
| Clinopyroxene | 3 | 44 | 0.2–2.0 | | Anhedral, oikocrysts. | |
| Olivine | 0 | 2 | 0.15 | | Subhedral. | |
| Magnetite | 2 | 2 | 0.02–0.45 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Chlorite | 3 | Olivine. | | | | In plagioclase cracks. In alteration halo is associated with prehnite. |
| Albite | 2 | Plagioclase. | | | | Minor replacement but widespread. |
| Actinolite | 39 | Clinopyroxene, interstitial. | | | | Also minor after plagioclase. |
| Titanite | Tr | Plagioclase. | | | | With actinolite and chlorite. Also as subhedral grains in groundmass. |
| Prehnite | Tr | Plagioclase. | | | | With chlorite and titanite(/) in a highly altered plagioclase. |

COMMENTS: Thin section includes one actinolite vein (1.3 to 0.7 mm wide) with intensely altered halos, 5 to 8 mm wide. Large actinolite fibers in the vein are normal to the vein walls, but very fine fibrous actinolite occurs elsewhere in the vein. Vein is purely extensional based on offset crystals. Point count in alteration halo: magmatic 43%, amphibole 51%, chlorite 1.2%, and albite 4.4%. Point count outside of halo: magmatic phases 68%, amphibole 27%, and chlorite 5%.

148-504B-247R-1 (Piece 12, 46–50 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 285

ROCK NAME: Sparsely phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|----------------------------------|-----------------|--------------------------------|-----------|-------------|--------------------------------|--|
| Olivine | 0 | 1 | 0.4–1.0 | | Euhedral, equant. | |
| Plagioclase | 1 | 1 | 1.5–2.0 | | Euhedral to subhedral, equant. | |
| Spinel | Tr | Tr | 0.04–0.06 | | Anhedral. | In plagioclase. |
| GROUNDMASS | | | | | | |
| Plagioclase | 48 | 48 | 0.1–0.5 | | Subhedral, laths. | |
| Clinopyroxene | 4 | 38 | 1 | | Anhedral, oikocrysts. | |
| Magnetite | 1 | 2 | 0.02–0.42 | | Anhedral to euhedral, equant. | |
| Unspecified SECONDARY MINERALOGY | | 9 | | | | Probably replacing olivine. |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Actinolite | 45 | Clinopyroxene, olivine, veins. | | | | |
| Chlorite | Tr | Olivine, interstitial. | | | | |
| Albite | Tr | Cracks in plagioclase. | | | | Filling cracks in plagioclase in halos or reaction zone. |
| Titanite | Tr | Interstitial. | | | | Filling interstitial material as tiny crystals. |
| Oxide | 1 | Interstitial. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Plagioclase in halos cracked and filled with amphibole. At least two generations of amphibole veinlets are present. Two subparallel 0.2-mm-wide veins crosscut a 0.8 mm vein; numerous veinlets (<0.2 mm) partly cut other veins. Alteration halos around all these veins merge together (more or less).

148-504B-247R-1 (Piece 15, 64–68 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 285

ROCK NAME: Moderately phyric olivine-plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|----------------------------------|-----------------|---------------------------------------|-----------|-------------|--------------------------------|--|
| Olivine | 0 | 8 | 0.4–1.2 | | Euhedral, equant. | Traces of fresh olivine. |
| Plagioclase | 1 | 1 | 0.7–2.9 | | Subhedral, equant. | One 2-mm grain with dense area of glass inclusions. |
| Spinel | Tr | Tr | 0.03–0.10 | | Euhedral to subhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 46 | 46 | 0.09–0.49 | | Subhedral, laths to needles. | |
| Clinopyroxene | 19 | 39 | 0.2–2.2 | | Anhedral, equant. | Oikocrysts. |
| Magnetite | 3 | 3 | 0.02–0.34 | | Euhedral to subhedral, equant. | |
| Unspecified SECONDARY MINERALOGY | | REPLACING/ FILLING | | | | 12% probably replacing olivine. |
| | PERCENT | | | | | COMMENTS |
| Actinolite | 25 | Interstitial, clinopyroxene, olivine. | | | | |
| Chlorite | 2 | Interstitial, olivine. | | | | |
| Albite | Tr | Plagioclase. | | | | Minor in cracks in plagioclase. |
| Quartz | Tr | Olivine. | | | | In olivine pseudomorphs. |
| Talc | 4 | Interstitial, olivine. | | | | Together with actinolite and magnetite. Includes magnetite and pyrite replacing olivine. |
| Magnetite | Tr | Olivine. | | | | |
| Pyrite | Tr | Olivine. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Two patches or vugs are filled by altered clinopyroxene and interstitial material in which some plagioclases are cracked and filled by amphibole.

148-504B-247R-1 (Piece 17, 72–76 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 286

ROCK NAME: Moderately phyric plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Intergranular, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|-----------------------------------|-----------|-------------|--|-------------------------------------|
| Olivine | Tr | 1 | 0.2–1.0 | | Euhedral, equant. | Fresh olivine in core. |
| Plagioclase | 6 | 6 | 0.4–0.6 | | Euhedral to anhedral, equant to tabular. | |
| Clinopyroxene | Tr | Tr | 0.5–1.5 | | Anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 40 | 40 | 0.05–0.3 | | Subhedral, laths. | |
| Clinopyroxene | 38 | 54 | 0.02–0.1 | | Anhedral, equant. | |
| Magnetite | 4 | 4 | 0.02–0.13 | | Euhedral to anhedral, equant. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Actinolite | 9 | Clinopyroxene rims, interstitial. | | | | |
| Chlorite | 1 | Olivine. | | | | With quartz and magnetite. |
| Talc | 1 | Olivine. | | | | With magnetite. |
| Titanite | Tr | Interstitial. | | | | Scattered in interstitial material. |
| Magnetite | 1 | Olivine. | | | | |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | |
| Vesicles | 0 | | | | | |

COMMENTS: Actinolite, chlorite, talc, and magnetite sometimes replace olivine. The rock is relatively fresh.

148-504B-247R-1 (Piece 19, 79–83 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 286.

ROCK NAME: Moderately phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|---|---|
| Plagioclase | 6 | 7 | 0.54–2.2 | | Subhedral, equant to laths. | |
| Olivine | 0 | 1 | 0.1–1 | | Equant. | |
| Clinopyroxene | Tr | Tr | 0.4–0.8 | | Anhedral, equant. | |
| Spinel | Tr | Tr | 0.04 | | Equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 38 | 41 | 0.05–0.45 | | Subhedral to anhedral, laths and needles. | |
| Clinopyroxene | 3 | 49 | 0.02–0.15 | | Anhedral, equant. | |
| Opaque minerals | 3 | 3 | 0.02–0.4 | | Subhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Laumontite | Tr | Plagioclase. | | | | |
| Chlorite | 3 | Olivine and plagioclase. | | | | Filling cracks in plagioclase. Associated with actinolite, after olivine, in alteration halo. |
| Actinolite | 47 | Clinopyroxene and interstitial material. | | | | Also after olivine in vein halo. |
| Titanite | Tr | Interstitial material. | | | | |
| Quartz | Tr | Olivine. | | | | |
| Pyrite | Tr | Olivine. | | | | |
| Chalcopyrite | Tr | Ilmenite and interstitial material. | | | | Associated with Fe-Ti oxide lamellae. Also in interstitial space. |
| Ilmenite | Tr | Fe-Ti oxide minerals. | | | | |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | | | | | | None. |

COMMENTS: Vein approximately 2.0-mm wide comprises 3 layers; central fine-grained chlorite and actinolite (with fibers parallel to vein walls), an intermediate layer of fine fibrous actinolite, and outer layer of "bladed" actinolite, oriented normal to the vein wall. The halo associated with the vein contains olivine completely altered to actinolite, near the vein, and actinolite and chlorite further from the vein.

148-504B-248R-1 (Piece 13, 43–48 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 288

ROCK NAME: Highly phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Intergranular, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|---------------------------------------|-----------|-------------|-------------------------------|--|
| Olivine | 0 | 5 | 0.2–1.2 | | Euhedral, equant. | |
| Plagioclase | 8 | 8 | 0.60–1.54 | | Euhedral, equant to tabular. | Sometimes overgrown by chlorite. |
| Clinopyroxene | Tr | Tr | 0.75–1.5 | | Subhedral, equant. | |
| Spinel | Tr | Tr | 0.05 | | Anhedral. | In clinopyroxene. |
| GROUNDMASS | | | | | | |
| Plagioclase | 44 | 44 | 0.06–0.46 | | Subhedral, laths. | |
| Clinopyroxene | 11 | 35 | 0.05–0.20 | | Anhedral, equant. | |
| Magnetite | 1 | 3 | 0.02–0.14 | | Anhedral to euhedral, equant. | |
| Olivine | 0 | 4 | 0.2 | | Subhedral, equant. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/FILLING | | | | COMMENTS |
| Actinolite | 28 | Interstitial, clinopyroxene, olivine. | | | | |
| Chlorite | 6 | Olivine, interstitial, plagioclase. | | | | Filling cracks in plagioclase. |
| Albite | Tr | Plagioclase | | | | In cracks. |
| Titanite | Tr | Interstitial. | | | | Scattered in interstitial material, replacing olivine? |
| Sulfide minerals | Tr | Olivine. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Alteration patch is filled with amphibole replacing clinopyroxene.

148-504B-249R-1 (Piece 27, 87–89 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 290

ROCK NAME: Moderately phyrlic olivine-plagioclase diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|----------------------------------|-----------------|---------------------------------------|-----------|-------------|---|--|
| Olivine | 0 | 2 | 0.6–1.4 | | Equant. | |
| Plagioclase | 2 | 2 | 0.5–1.66 | | Euhedral to subhedral, equant to tabular. | Crystals are often cracked. |
| Clinopyroxene | Tr | Tr | 0.7–1.5 | | Anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 52 | 52 | 0.05–0.45 | | Subhedral to anhedral, plates to needles. | Crystals are often cracked. |
| Clinopyroxene | 1 | 34 | 0.1–0.5 | | Anhedral, equant. | |
| Magnetite | 1 | 3 | 0.02–0.12 | | Euhedral to anhedral. | |
| Unspecified SECONDARY MINERALOGY | PERCENT | REPLACING/FILLING | | | | COMMENTS |
| Actinolite | 42 | Interstitial, clinopyroxene. | | | | |
| Chlorite | 1 | Olivine, clinopyroxene, interstitial. | | | | |
| Carbonate | Tr | Olivine. | | | | Tiny crystals. |
| Albite | Tr | Plagioclase. | | | | Filling plagioclase cracks. |
| Titanite | 1 | Interstitial. | | | | Tiny interstitial crystals. |
| Prehnite | Tr | Plagioclase. | | | | |
| Pumpellyite | Tr | Plagioclase. | | | | Occuring near sulfide minerals. |
| Anorthite | Tr | Plagioclase. | | | | Incomplete rim on plagioclase near vein. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Fibrous amphibole fills 2.5-mm-wide vein. Most of the thin section is the alteration halo adjacent to the vein. Pumpellyite occurrence is questionable.

SITE 504

148-504B-249R-1 (Piece 28, 92-98 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 290

ROCK NAME: Highly phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic, glomerophyrlic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|----------------------------------|-----------------|-------------------------|-----------|-------------|---------------------------------|--|
| Olivine | 0 | 2 | 0.4-0.6 | | Equant. | |
| Plagioclase | 7 | 7 | 0.54-1.47 | | Equant, subhedral. Also plates. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 38 | 38 | 0.07-0.5 | | Subhedral plates, laths. | |
| Clinopyroxene | 8 | 40 | 0.1-0.4 | | Equant, anhedral. | |
| Magnetite | 2 | 2 | 0.02-0.32 | | Euhedral, anhedral, equant. | |
| Unspecified SECONDARY MINERALOGY | | REPLACING/ FILLING | | | | 7% unspecified, most probably olivine replacement. |
| Talc | Tr | Olivine, partly. | | | | In chilled margin, with magnetite and pyrite. |
| Chlorite | 3 | Olivine. | | | | With actinolite, quartz, and titanite(?). Possibly also interstitial. |
| Actinolite | 41 | Clinopyroxene. | | | | In vugs, cracks in plagioclase. Some actinolitic hornblende has clear 60°-120° cleavages. |
| Titanite | Tr | Magnetite and ilmenite. | | | | Microgranular in groundmass after magnetite. Very local replacement. Much magnetite remaining with ilmenite exsolution lamellae. |
| Quartz | Tr | Olivine. | | | | With chlorite and actinolite. |
| Laumontite | Tr | Plagioclase vugs. | | | | With chlorite and actinolite in "vugs"; in veinlets in plagioclase. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | 0 | | | | | |

COMMENTS: No alteration is apparent in host rock near chilled margin contact. In the chilled margin, olivine (1.4% present, 1.4% original) is 0.1-0.7 mm, equant subhedral, and locally altered. Plagioclase (5% present, 5% original) is 0.1-0.05 mm, euhedral equant to plates to needles. Clinopyroxene (2% present, 2% original) is 0.4-0.6 mm, equant to plates, euhedral to subhedral. Spinel occurs in trace amounts in 0.02 mm anhedral grains. Unspecified minerals comprise 92% of the chilled margin. In the margin, olivine is altered to talc only when near or cut by thin (0.08 mm) actinolite veinlet. Clinopyroxene and plagioclase phenocrysts are fresh in the margin. The margin groundmass is replaced possibly by very fine-grained actinolite. Pyrite occurs frequently along fissures and disseminated throughout rock.

148-504B-249R-1 (Piece 35, 119-123 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 291.

ROCK NAME: Moderately phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomerophyrlic, subophitic to intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|----------------------------------|-----------------|--|-----------|-------------|---|---|
| Olivine | 0 | 3 | 0.4-1.0 | | Equant. | |
| Plagioclase | 6 | 6 | 0.43-1.45 | | Euhedral to subhedral, equant to tubular. | |
| Clinopyroxene | Tr | Tr | 0.5-5.0 | | Subhedral to anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 47 | 47 | 0.06-0.58 | | Euhedral to subhedral, equant to needles. | |
| Clinopyroxene | 25 | 45 | 0.05-0.4 | | Anhedral, equant. | |
| Olivine | 0 | 1 | 0.2-0.4 | | Equant. | |
| Magnetite | 2 | 2 | 0.02-0.21 | | Euhedral to anhedral. | |
| Unspecified SECONDARY MINERALOGY | | REPLACING/ FILLING | | | | COMMENTS |
| Talc | Tr | Olivine. | | | | With magnetite and minor pyrite. |
| Chlorite | 5 | Plagioclase cracks, olivine and in vein. | | | | With quartz, titanite, and minor actinolite. |
| Albite | 1 | Plagioclase. | | | | |
| Actinolite | 14 | Clinopyroxene and interstitial material. | | | | Replacement of clinopyroxene is very patchy. Also in vein. |
| Titanite | Tr | Olivine and interstitial material. | | | | Also in vein. |
| Quartz | Tr | Olivine and vein. | | | | With chlorite and talc when replacing olivine. With chlorite in vein. |
| Magnetite | Tr | Olivine. | | | | |
| Pyrite | Tr | Olivine. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | None. | | | | | |

COMMENTS: One 0.08-mm-wide chlorite, titanite, and quartz veinlet, with central single fiber of actinolite that parallels selvages, and contains actinolite when cutting clinopyroxene. The vein has no alteration halo and crosses olivines replaced by chlorite, indicating two generations of chlorite. In crossed polar light, the chlorite is blue-gray in the vein and in the altered olivine cut by the vein and anomalous brown and blue when replacing olivine elsewhere.

148-504B-249R-1 (Piece 40, 134–138 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 291

ROCK NAME: Highly phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomerophyrlic, subophitic to intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|--|--|
| Olivine | 0 | 4 | 0.2–3.3 | | Equant. | |
| Plagioclase | 5 | 6 | 0.57–1.05 | | Euhedral to subhedral, equant to plates. | |
| Clinopyroxene | 1 | 1 | 1.0–5.0 | | Subhedral plates. | |
| Spinel | Tr | Tr | 0.02 | | Anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 38 | 45 | 0.06–0.47 | | Subhedral to anhedral laths. | |
| Clinopyroxene | 6 | 43 | 0.05–0.2 | | Anhedral, equant. | |
| Opaque minerals | 1 | 1 | 0.02–0.52 | | Euhedral to anhedral. | Magnetite and pyrite. |
| SECONDARY MINERALOGY | | | | | | |
| Chlorite | 7 | REPLACING/ FILLING Olivine and plagioclase cracks. | | | | COMMENTS Replaces olivine with actinolite in the vein halo and with no, or only minor, actinolite outside the halo. |
| Albite | 1 | Plagioclase. | | | | Minor, along cracks. |
| Actinolite | 40 | Clinopyroxene and interstitial material. | | | | Also olivine, close to vein, and plagioclase along cracks. |
| Titanite | Tr | Olivine. | | | | With chlorite and actinolite. |
| Quartz | 1 | Olivine. | | | | With chlorite. |
| Pyrite | Tr | Olivine. | | | | With chlorite. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-----------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | | | | | | None. |

COMMENTS: The section is cut by one 1.6- to 2-mm-wide actinolite and magnetite vein, with a 7- to 9-mm-wide alteration halo, and a 0.08-mm-wide actinolite vein included in the alteration halo and parallel to the wider vein. The modal abundance listed above is a combination of host rock and alteration halo abundances. Point count in alteration halo: Primary phases: 38%, actinolite: 58%, chlorite: 1%, and albite 2%. Point count in host rock: Primary phases: 62%, actinolite: 24%, chlorite: 12%, albite: Tr, quartz: 2%, and sulfide: Tr.

148-504B-249R-2 (Piece 6, 19–24 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 291

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomerophyrlic, subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|--|---|
| Olivine | 0 | 1 | 0.15–1.2 | | Equant. | |
| Plagioclase | 4 | 4 | 0.4–1.4 | | Euhedral to anhedral, equant to plates. | |
| Spinel | Tr | Tr | 0.05 | | Equant. | In olivine. |
| GROUNDMASS | | | | | | |
| Plagioclase | 47 | 49 | 0.14–0.4 | | Subhedral to anhedral, laths to needles. | |
| Clinopyroxene | 25 | 44 | 0.1–1.2 | | Anhedral, equant. | Large grains are oikocrysts. |
| Opaque minerals | 3 | 3 | 0.02–0.18 | | Euhedral to anhedral, equant. | |
| SECONDARY MINERALOGY | | | | | | |
| Talc | 1 | REPLACING/ FILLING Olivine. | | | | COMMENTS With magnetite and talc/chlorite. |
| Chlorite | Tr | Olivine and plagioclase. | | | | |
| Actinolite | 20 | Clinopyroxene and interstitial material. | | | | |
| Quartz | Tr | Olivine. | | | | With chlorite and magnetite. |
| Magnetite | Tr | Olivine. | | | | With talc. |
| Pyrite | Tr | Olivine. | | | | |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-----------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | | | | | | None. |

COMMENTS: Some actinolite is very deep green in color, Fe + Cl rich? Olivine replacement is often strongly zoned. Talc/anthophyllite may be present in a plagioclase phenocryst.

148-504B-250R-1 (Piece 16, 57-60 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 291.

ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic to subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|--|--|
| Olivine | 0 | 1 | 0.5-3.5 | | Equant. | |
| Plagioclase | 3 | 4 | 0.5-1.68 | | Subhedral plates and laths. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 39 | 45 | 0.07-0.5 | | Subhedral to anhedral laths and needles. | |
| Clinopyroxene | 5 | 46 | 0.1-1.0 | | Anhedral, equant. | |
| Opaque minerals | 3 | 1 | 0.02-0.23 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | REPLACING/FILLING | | | | COMMENTS |
| Chlorite | 2 | Olivine and plagioclase. | | | | With actinolite when replacing olivine. |
| Albite | Tr | Plagioclase. | | | | In cracks and crystals. |
| Actinolite | 48 | Clinopyroxene and interstitial material. | | | | Complete replacement in alteration halos, partial in remainder. Minor after plagioclase. |
| Titanite | Tr | Groundmass. | | | | |
| Quartz | Tr | Olivine. | | | | With chlorite. |
| Talc | Tr | ? | | | | Very rare, with magnetite. |
| Epidote | Tr | Plagioclase. | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | | | | | | None. |

COMMENTS: Modal values are for the alteration halo, outside halo alteration is approximately 20%. Section is cut by one 0.8-mm-wide actinolite vein with 5-mm-thick alteration halo, a 0.1-mm-thick actinolite vein parallel to the vein, and numerous 0.05-mm-thick actinolite veinlets. The widest vein hosts small plagioclase clasts in its core. One grain of a translucent blue, isotropic, reflective mineral (spinel?) was seen associated with titanite.

148-504B-250R-1 (Piece 22, 77-81 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 291.

ROCK NAME: Moderately phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomerophyrlic, ophitic to subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|--|--|
| Olivine | 0 | 3 | 0.4-1.2 | | Equant. | |
| Plagioclase | 4 | 4 | 0.87-3.77 | | Euhedral to subhedral, equant to plates. | |
| Clinopyroxene | 1 | 1 | 0.75-1.5 | | Anhedral, equant. | |
| Spinel | Tr | Tr | 0.1 | | Euhedral, equant. | Symplectic. |
| GROUNDMASS | | | | | | |
| Plagioclase | 36 | 41 | 0.12-0.55 | | Subhedral to anhedral laths. | |
| Clinopyroxene | 9 | 47 | 0.15-0.5 | | Anhedral, equant. | |
| Olivine | 0 | Tr | 0.2-0.4 | | Equant. | |
| Opaque minerals | 1 | 1 | 0.02-0.3 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | REPLACING/FILLING | | | | COMMENTS |
| Chlorite | 6 | Olivine and plagioclase. | | | | With quartz and actinolite when after olivine. In cracks in plagioclase. |
| Albite | 1 | Plagioclase. | | | | Extensively in one part of the section. |
| Actinolite | 42 | Clinopyroxene and interstitial material. | | | | Also after olivine (minor). |
| Quartz | Tr | Olivine. | | | | With chlorite. |
| Epidote | Tr | Plagioclase. | | | | In albitized plagioclase. |
| Chalcopyrite | Tr | Olivine. | | | | |
| Titanite | Tr | Olivine. | | | | In albite and titanite veins, after magnetite. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
|-------------------|---------|----------|-----------|---------|-------|----------|
| Vesicles | | | | | | None. |

COMMENTS: Section is cut by a 0.35-mm-thick actinolite vein, with 3- to 4-mm-thick alteration halo, that cuts a 4-mm-diameter actinolite alteration patch. Outside the vein, alteration halos are "patchy altered" areas with more intense alteration. Several 0.01-mm-thick subparallel chlorite + titanite veinlets were also noted. Where these veins cut pyroxene or groundmass amphibole they contain amphibole.

148-504B-250R-1 (Piece 32, 112-117 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 292

ROCK NAME: Moderately phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic, intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|--|--|
| Olivine | 0 | 1 | 0.4-0.8 | | Equant. | |
| Plagioclase | 3 | 3 | 0.52-1.48 | | Subhedral to anhedral, equant to laths. | |
| Clinopyroxene | 1 | 1 | 0.4-1.5 | | Anhedral, equant. | |
| GROUNDMASS | PERCENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Plagioclase | 45 | 48 | 0.07-0.47 | | Subhedral to anhedral, plates and laths. | |
| Clinopyroxene | 26 | 46 | 0.1-0.2 | | Anhedral, equant. | |
| Opaque minerals | 2 | 2 | 0.02-0.25 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Chlorite | 5 | Olivine and plagioclase. | | | | With very minor actinolite when replacing olivine. |
| Actinolite | 18 | Clinopyroxene and interstitial material. | | | | |
| Titanite | Tr | ? | | | | |
| Quartz | Tr | Olivine. | | | | With chlorite. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | | | | | | None. |

COMMENTS: Pyrite and chalcopyrite are common. Magnetite is relatively fresh.

148-504B-251R-1 (Piece 2, 6-7 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 292

ROCK NAME: Moderately phyrlic plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Intergranular.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|------------------------------------|-----------|-------------|---|---|
| Olivine | 0 | 1.2 | 0.3-0.8 | | Equant. | |
| Plagioclase | 5 | 6.8 | 0.4-1.29 | | Subhedral laths. | |
| Clinopyroxene | 2 | 2 | 0.2-1.0 | | Subhedral to anhedral, equant to laths. | |
| Spinel | Tr | Tr | 0.04 | | Equant. | |
| GROUNDMASS | PERCENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Plagioclase | 40 | 47 | 0.05-0.34 | | Subhedral, laths to needles. | |
| Clinopyroxene | 21 | 40 | 0.05-0.2 | | Anhedral, equant. | |
| Opaque minerals | 3 | 3 | 0.02-0.22 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | PERCENT | REPLACING/ FILLING | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
| Zeolites | 1 | Plagioclase. | | | | In vein halo, with chlorite and titanite. |
| Chlorite | 6 | Olivine and plagioclase. | | | | |
| Actinolite | 21 | Clinopyroxene and olivine. | | | | |
| Titanite | 1 | Interstitial space and vein. | | | | |
| Pyrite | Tr | Interstitial material. | | | | Also associated with exsolution lamellae of ilmenite. |
| Chalcopyrite | Tr | Olivine and interstitial material. | | | | |
| Ilmenite | Tr | Fe-Ti oxide minerals. | | | | Forming exsolution lamellae. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | | | | | | None. |

COMMENTS: Vein, approximately 1.0 mm wide, is composed of chlorite, quartz, acicular actinolite, and very fine-grained titanite and pyrite. Secondary Na-Ti diopside occurs as a thin, <5-µm, green "layer" altering magmatic augite in contact with the vein.

148-504B-251R-1 (Piece 4, 18–20 cm)
 ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Subophitic.

OBSERVER: IMS

WHERE SAMPLED: Unit 293

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|---------------------------------------|-----------|-------------|---------------------------------------|--|
| Olivine | 0 | 1 | 0.5 | | Euhedral-equant. | |
| Plagioclase | 2 | 3 | 0.5–2.56 | | Euhedral, equant to plates. | |
| Spinel | Tr | Tr | 0.04–0.2 | | Euhedral-subhedral, equant. | Symplectic replacement in plagioclase. |
| GROUNDMASS | | | | | | |
| Plagioclase | 14 | 37 | 0.09–0.48 | | Euhedral-subhedral laths and needles. | |
| Clinopyroxene | | 46 | | | | |
| Opaque minerals | 1 | 1 | 0.7 | | Anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| Chlorite | 1 | REPLACING/ FILLING Plagioclase. | | | | COMMENTS Veinlets crosscut plagioclase and secondary anorthitic rims. |
| Albite | 5 | Plagioclase. | | | | Veinlets through plagioclase laths; crosscut the secondary anorthitic rims. |
| Actinolite | 72 | Groundmass clinopyroxene. | | | | Coarse fibrous crystals after clinopyroxene. Fine-bladed crystals in mats, with an interstitial low order birefringence mineral. |
| Titanite | Tr | Groundmass. | | | | |
| Anorthite | 5 | Plagioclase. | | | | Rims, complete or incomplete, charged with inclusions. |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Amphibole is coarse and fibrous after clinopyroxene and present as fine-bladed crystals altering the unidentified groundmass material. Secondary anorthite is very well developed at an early stage in the alteration history and is crosscut by albite and chlorite. A thin section was made of a large (5-cm) well-developed alteration patch.

148-504B-251R-1 (Piece 5, 28–30 cm)
 ROCK NAME: Moderately phyrlic plagioclase-olivine diabase.
 GRAIN SIZE: Fine-grained.
 TEXTURE: Ophitic-subophitic.

OBSERVER: IMS

WHERE SAMPLED: Unit 293

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|--|-----------|-------------|------------------------------|---|
| Olivine | 1 | | 0.4–0.6 | | Euhedral, equant. | |
| Plagioclase | 2 | 2 | 0.5–2.15 | | Subhedral-anhedral, equant. | |
| Spinel | Tr | Tr | 0.04–0.1 | | Euhedral-anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 34 | 46 | 0.06–0.49 | | Subhedral, laths to needles. | |
| Clinopyroxene | 3 | 46 | 0.4–2.0 | | Anhedral, equant. | Large grains are oikocrysts. |
| Opaque minerals | 2 | 2 | 0.02–0.35 | | Euhedral-anhedral, equant. | |
| SECONDARY MINERALOGY | | | | | | |
| Chlorite | 3 | REPLACING/ FILLING Plagioclase, olivine, and groundmass. | | | | COMMENTS Replaces plagioclase along cracks, and olivine in association with magnetite. Interstitial material replaced by chlorite with actinolite, titanite, and very minor epidote. Some clinopyroxene altered to chlorite with actinolite. |
| Albite | 4 | Plagioclase. | | | | Localized replacement along veins. |
| Actinolite | 47 | Plagioclase, clinopyroxene, groundmass. | | | | |
| Anorthite | 5 | Plagioclase. | | | | Incomplete rims, strongly developed near veins. |
| Prehnite | Tr | Plagioclase and interstitial material. | | | | |
| Epidote | Tr | Plagioclase, interstitial material. | | | | Associated with prehnite within plagioclase grains and within a 0.07-mm chlorite vug. |
| Titanite | Tr | Magnetite, ilmenite. Also in vug with chlorite. | | | | |
| Chalcopyrite | Tr | | | | | |

| VESICLES/CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: Network of subparallel veinlets (<0.1-mm thick), and one 0.8-mm-thick actinolite-chlorite vein is associated with a vague halo (≤ 10 mm half-width). One area contains brecciated and very altered plagioclase (into chlorite and quartz \pm laumontite).

148-504B-251R-1 (Piece 7, 49–51 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 293.

ROCK NAME: Moderately phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic-subophitic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|---|-----------|-------------|--------------------------------------|--|
| Olivine | 0 | 1 | 0.4–1 .5 | | Euhedral, equant. | |
| Plagioclase | 5 | 5 | 0.54–1.87 | | Euhedral-subhedral, equant to platy. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 37 | 42 | 0.07–0.5 | | Subhedral, equant to needles. | |
| Clinopyroxene | 11 | 48 | 0.2–2.0 | | Anhedral, equant oikocrysts. | |
| Opaque minerals | 3 | 3 | 0.02–0.27 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| Chlorite | 6 | REPLACING/ FILLING | | | | COMMENTS |
| | | Olivine, clinopyroxene, and groundmass. | | | | Replacing olivine with actinolite and minor magnetite, pyrite, and titanite. Within fine veins in plagioclase. |
| Actinolite | 33 | Clinopyroxene and groundmass. | | | | Cores of pyroxene grains pseudomorphed by fibrous mats of amphibole. |
| Titanite | 1 | Magnetite, olivine, and clinopyroxene. | | | | |
| Quartz | Tr | Olivine. | | | | |
| Plagioclase | 4 | Plagioclase | | | | Calcic rims with abundant inclusions and albitic cracks developed through igneous plagioclase. |
| ?Anorthite | | | | | | |
| Pyrite/ Chalcopyrite | Tr | Subhedral grains. | | | | |
| Ilmenite | Tr | Magnetite. | | | | Trellis of ilmenite after magnetite with associated fine-grained titanite. |
| VESICLES/ CAVITIES | | | | | | |
| Vesicles | 0 | LOCATION | SIZE (mm) | FILLING | SHAPE | |

COMMENTS: Very distinct calcic plagioclase (probably anorthite) rims incompletely replace the plagioclase laths that are located in a cm-scale alteration patch.

148-504B-252R-1 (Piece 4, 12–15 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 293

ROCK NAME: Moderately phyric clinopyroxene-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic, glomerophyric.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------------|-----------------|---|-----------|-------------|--------------------------------------|--|
| Olivine | | 1 | 0.2 | | Equant. | |
| Plagioclase | 3 | 4 | 0.5–1.4 | | Euhedral-subhedral, equant to platy. | |
| Spinel | Tr | Tr | 0.02–0.1 | | Euhedral-anhedral, equant. | Inclusions within plagioclase. |
| GROUNDMASS | | | | | | |
| Plagioclase | 29 | 43 | 0.06–0.48 | | Anhedral-subhedral, equant to laths. | |
| Clinopyroxene | Tr | 41 | 0.3–1.0 | | Anhedral, equant. | |
| Opaque minerals | 2 | 2 | 0.02–0.34 | | Euhedral-anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| Chlorite | 1 | REPLACING/ FILLING | | | | COMMENTS |
| | | Olivine, groundmass. | | | | Fine veinlets through plagioclase. |
| Albite | Tr | Plagioclase. | | | | Almost total replacement of the original pyroxene by large crystals of actinolite. Interstitial material replaced by a mat of fine needles of amphibole. Minor actinolite along cracks within plagioclase. |
| Actinolite | 51 | Clinopyroxene, plagioclase, groundmass. | | | | Microclusters of titanite between trellis of ilmenite. |
| Titanite | 1 | Titanomagnetite. | | | | Abundant replacement of plagioclase rims by a more calcic composition. Small plagioclase grains can be totally replaced by anorthite. |
| Anorthite | 13 | Plagioclase rims. | | | | Trellis of ilmenite with associated titanite. |
| Ilmenite | Tr | Titanomagnetite. | | | | |
| VESICLES/ CAVITIES | | | | | | |
| Vesicles | 0 | LOCATION | SIZE (mm) | FILLING | SHAPE | |

COMMENTS: One 0.12-mm-thick actinolite vein merges with a several subparallel actinolite (0.05-mm) veinlets.

148-504B-252R-1 (Piece 5, 15–20 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 293

ROCK NAME: Moderately phyric plagioclase-olivine diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic, glomerophyric.

| PRIMARY MINERALOGY | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------|-----------------|---------------------------------------|-----------|-------------|------------------------------|---|
| PHENOCRYSTS | | | | | | |
| Olivine | 0 | 1 | 0.4–1.5 | | Equant. | |
| Plagioclase | 3 | 3 | 0.5–1.44 | | Subhedral, equant. | |
| Spinel | Tr | Tr | 0.05 | | Anhedral, equant. | |
| GROUNDMASS | | | | | | |
| Plagioclase | 20 | 32 | 0.06–0.48 | | Subhedral, laths to needles. | |
| Clinopyroxene | 0 | 40 | 0.4–1.0 | | Anhedral, equant. | Oikocrysts. |
| Oxide minerals | Tr | 1 | 0.02–0.21 | | Euhedral to anhedral. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Actinolite | 72 | Olivine, clinopyroxene, interstitial. | | | | Also fills cracks in plagioclase. |
| Albite | 8 | Plagioclase. | | | | Partly replacing plagioclase. |
| Laumontite | Tr | Plagioclase. | | | | Laumontite and coarse epidote after plagioclase. |
| Epidote | Tr | Plagioclase. | | | | |
| Anorthite | Tr | Plagioclase. | | | | Replacement of small plagioclase laths and rims of larger grains. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-----------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: 23% of groundmass is altered such that previous mineralogy is not obvious. Very little ilmenite is left, all the magnetite has been replaced.

148-504B-253R-1 (Piece 1, 0–4 cm)

OBSERVER: IMS

WHERE SAMPLED: Unit 294

ROCK NAME: Moderately phyric plagioclase-olivine-clinopyroxene diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic, glomerophyric, intergranular.

| PRIMARY MINERALOGY | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|-----------------------------|-----------------|---------------------------------------|-----------|-------------|--|--|
| PHENOCRYSTS | | | | | | |
| Olivine | 0 | 1 | 0.4–1.0 | | Equant. | |
| Plagioclase | 3 | 3 | 1.2 | | Euhedral to subhedral, equant. | |
| Clinopyroxene | 1 | 1 | 0.5–2.0 | | Anhedral, equant. | Oikocrysts. |
| Spinel | Tr | Tr | 0.02 | | Round. | In plagioclase glomerocryst. |
| GROUNDMASS | | | | | | |
| Plagioclase | 41 | 43 | 0.07–0.49 | | Subhedral to anhedral, needles to laths. | |
| Clinopyroxene | 27 | 48 | 0.1–0.2 | | Anhedral, equant. | |
| Opaque minerals | 2 | 2 | 0.02–0.25 | | Euhedral to anhedral, equant. | |
| SECONDARY MINERALOGY | | | | | | |
| | PERCENT | REPLACING/ FILLING | | | | COMMENTS |
| Actinolite | 23 | Interstitial material, clinopyroxene. | | | | Together with pyrite (more abundant than magnetite), surrounded by chlorite at rim of replacement. |
| Talc | Tr | Olivine. | | | | Together with quartz and talc. |
| Chlorite | Tr | Olivine. | | | | Very rare. |
| Albite | Tr | Plagioclase. | | | | |
| Titanite | Tr | Interstitial. | | | | |
| Quartz | Tr | Olivine. | | | | Together with talc. |
| Pyrite | 3 | Olivine. | | | | In olivine replacement, in actinolite. |
| Chalcopyrite | Tr | | | | | Minor. |

| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE |
|-----------------------|---------|----------|-----------|---------|-------|
| Vesicles | 0 | | | | |

COMMENTS: The section contains no secondary Ca-plagioclase.

148-504B-256M-1 (Piece 2, 7-12 cm)

OBSERVER: IMS

WHERE SAMPLED: Junk basket

ROCK NAME: Porphyritic diabase.

GRAIN SIZE: Fine- to medium-grained.

TEXTURE: Hypidiomorphic-granular, ophitic to subophitic, porphyritic.

| PRIMARY MINERALOGY PHENOCRYSTS | PERCENT PRESENT | PERCENT ORIGINAL | SIZE (mm) | COMPOSITION | MORPHOLOGY | COMMENTS |
|--------------------------------|-----------------|------------------------------|-----------|-------------|------------------------------|--|
| Olivine | 0 | 3 | 0.8-2.0 | | Equant, rounded. | |
| Plagioclase | 60 | | 0.2-4.0 | | Lath, subhedral to anhedral. | Bimodal size distribution, porphyritic. |
| Clinopyroxene | 30 | | 0.2-3.2 | | Equant, anhedral. | Bimodal size distribution, porphyritic. |
| GROUNDMASS Magnetite | 1 | | 0.06-0.2 | | Anhedral. | Interstitial, altered in some places. |
| SECONDARY MINERALOGY | PERCENT PRESENT | REPLACING/ FILLING | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Clays | 3 | Olivine. | | | | Mixed-layer chlorite-smectite(?). |
| Talc | Tr | Olivine. | | | | Minor compared to mixed-layer clays. |
| Chlorite | 2 | Plagioclase, interstitial. | | | | |
| Albite | Tr | Plagioclase. | | | | |
| Actinolite | 4 | Interstitial, clinopyroxene. | | | | |
| Titanite | Tr | Magnetite. | | | | Associated with actinolite replacing clinopyroxene or in groundmass. |
| Pyrite | Tr | Interstitial, olivine. | | | | |
| Chalcopyrite | Tr | Pyrite, interstitial. | | | | Small grains inside pyrite and interstitial. |
| VESICLES/ CAVITIES | PERCENT | LOCATION | SIZE (mm) | FILLING | SHAPE | COMMENTS |
| Vesicles | | | | | | None. |

COMMENTS: Trace of magnetite with talc replaces olivine. Tiny crystals of zircon in trace amounts occur in actinolite in actinolitic patch. Sample location is not well constrained. Modal estimates were performed visually. Interstitial patches of alteration minerals (actinolite and chlorite), several mm across, are developed in some parts of the thin section.