

140-504B-185R-01 (Piece 3,15-19 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 211.

ROCK NAME: Moderately clinopyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.4	1.16		Equant, skeletal.	
Plagioclase	4.0	4.0	1.00-2.70		Subhedral thick	Forms clots. plates.
Clinopyroxene	8.0	8.0	0.60-2.03	Augite.	Subhedral, anhedral.	Ophitic to poikilitic, zoned.
GROUNDMASS						
Granophyre	Tr	1.2	?		Anhedral.	Interstitial granophyre formed from quartz and feldspar.
Pyrite+ chalcopyrite	Tr	?	?		Equant.	Included in albite and plagioclase.
Opaque minerals	3.8	1.6	0.14-0.21		Equant to subhedral.	Partly altered to titanite, included in plagioclase. Graphitic texture in quartz-feldspar granophyre.
Plagioclase	37.4	49.8	0.15-1.00		Subhedral.	Unzoned and inclusion-free.
Clinopyroxene	14.6	35.0	0.15-0.45	Augite.	Anhedral.	Ophitic to subophitic.
SECONDARY MINERALOGY						
Serpentine	PERCENT 1.0	REPLACING/FILLING Olivine.				COMMENTS Serpentine and magnetite (+chlorite) after olivine.
Chlorite	5.0	Olivine, vug.				
Albite	2.4	Plagioclase.				
Actinolite	23.8	Clinopyroxene.				
Titanite	Tr	Interstitial				
Magnetite		Olivine				Olivine with interstitial sulfide minerals in recrystallized igneous globules. 5-50 microns.
Pyrite	Tr	Interstitial, silicates.				
Chalcopyrite	Tr	Interstitial, silicates.				5-50 microns, inclusions in plagioclase.
VESICLES/CAVITIES						
Amygdules	PERCENT 2	LOCATION Scattered.	SIZE (mm) 0.2-0.5	FILLING Chlorite and minor actinolite.	SHAPE Irregular.	COMMENTS Sometimes difficult to distinguish from altered olivine.
Vein	?	?	0.10-0.15	Chlorite, actinolite	?	Thin (<0.5 mm) halo where clinopyroxene is extensively replaced by actinolite, plagioclase, and partially replaced by chlorite.

COMMENTS: Proto-troctolitic clot with blocky plagioclase in center. Some with interstitial olivine-plagioclase-magnetite pockets. Plagioclase: (1) One grain (2.5x1 mm) occurs in plagioclase-olivine cluster. The grain is slightly zoned and contains a 400-micron altered inclusion as well as a 150-micron-wide zone of 50-micron altered glass inclusions along the axis of the grain. A 400-micron-wide zone of altered glass inclusions, 10 microns or less in diameter includes the zone of 50-micron inclusions. (2) The most common plagioclase grains are equant, about 0.7x0.7 mm, with concentric zoning and rims about 40 microns wide. Feeble oscillations occur for another 50 microns inside the rim and the plagioclase is unzoned from there to the core. No inclusions are present. (3) A glomerophytic cluster, 2x2 mm, is composed of laths and prisms of normally zoned grains without oscillations. Rims are 50x100 microns and contain no inclusions. (4) A grain of plagioclase, 2.5x2.5 mm, with rare rounded glass inclusions (about 50 microns diameter) lies near the center. Its rim is about 200 microns wide with concentric oscillations.

SITE 504

140-504B-186R-01 (Piece 4,13-14 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 211

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.17-0.32		Euhedral.	Replaced by chlorite and magnetite.
Plagioclase	7.0	7.0	0.93-1.45		Subhedral laths.	
Clinopyroxene	7.0	7.0	1.36-3.34		Anhedral.	Partially altered to actinolite.
GROUNDMASS						
Granophyre	3.0	1.4	?	?		Interstitial albite and quartz.
Pyrite	Tr	?	?	?		Inclusions in plagioclase and groundmass.
Magnetite	5.6	2.1	0.05-0.10		Equant, skeletal.	Partially altered to titanite.
Plagioclase	37.6	42.4	?	?		
Clinopyroxene	16.0	38.3	?	?		
SECONDARY MINERALOGY						
Chlorite	PERCENT 3.8	REPLACING/FILLING Olivine, plagioclase.				COMMENTS Replaces olivine, plagioclase in fractures, and occurs as an interstitial and vein-filling mineral.
Albite	5.6	Plagioclase.				
Actinolite	12.4	Clinopyroxene, chlorite, plagioclase.				Occurs as an interstitial phase and vein-filling mineral with chlorite.
Titanite	2.0	Magnetite.				Replaces magnetite as selvages.
Pyrite	Tr	Olivine, chlorite, magnetite.				Subrounded grains, also occurs as an interstitial phase.
Chalcopyrite	Tr	Interstitial, silicates.				Aggregates with pyrite.
Magnetite	Tr	Clinopyroxene, olivine.				Fine-grained, replaces olivine with chlorite.
VESICLES/CAVITIES						
Vein	PERCENT ?	LOCATION Diabase/Xenolith?	SIZE (mm)	FILLING Actinolite, chlorite.	SHAPE ?	COMMENTS Actinolite and chlorite vein-cutting diabase host and gabbro xenolith.

COMMENTS: Clinopyroxene-plagioclase inclusion occupies half of thin section and is not counted as part of the primary mode. Xenolith: serpentine pseudomorphs after olivine, consisting of mesh-textured lizardite which recrystallizes to interpenetrating antigorite. Magnetite replaces olivine and is oxidized. Spongy pyrite replaces olivine. Serpentine is associated with chlorite, actinolite, and quartz. Plagioclase in gabbro xenolith is unzoned except where in contact with the groundmass. Typical phenocrysts are zoned with 100-micron rims with slight oscillations 20-50 microns inside the rim. Augite grains (up to 2x7 mm) are anhedral with euhedral plagioclase laths (up to 500x50 microns) enclosed in the rim.

140-504B-186R-01 (Piece 5,17-26 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 211.

ROCK NAME: Moderately clinopyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic, with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.0	0.35-3.42		Euhedral, subhedral.	Completely altered.
Plagioclase	8.0	8.0	0.80-3.94		Subhedral laths.	Zoned, partially altered.
Clinopyroxene	9.4	9.4	0.32-4.32	Augite.	Anhedral.	Inclusion-free cores with ophitic rims, some with sector-zoning and exsolution.
GROUNDMASS						
Opaque minerals	3.4	2.0	0.10-0.08		Anhedral, euhedral, skeletal.	Magnetite partially altered to titanite, as inclusions in plagioclase, graphic growth in albite and quartz, and rims of pyroxene altered to hydroxide.
Pyrite	Tr	Tr	?		Equant.	Inclusions in plagioclase.
Chalcopyrite	Tr	Tr	?		Equant.	Inclusions in plagioclase.
Plagioclase	37.0	41.0	0.2-0.8		Subhedral, skeletal.	
Clinopyroxene	16.8	34.6	0.25-0.8	Augite	Ophitic.	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	4.2	Plagioclase, clinopyroxene, olivine.				
Albite	4.0	Plagioclase.				
Actinolite	15.2	Clinopyroxene.				
Serpentine	2.0	Olivine.				Serpentine+chlorite+magnetite+/-quartz in pseudomorphs of rounded and euhedral olivine phenocrysts.
Pyrite	Tr	Olivine.				Interstitial, inclusions in plagioclase, 2-10 microns in size.
Chalcopyrite	Tr	Olivine.				Interstitial, inclusions in plagioclase, 2-10 microns in size, replacing plagioclase. Pyrite+chalcopyrite+magnetite intergrowths are recrystallized igneous sulfide globules.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	200 microns	Actinolite with minor chlorite.	Broad, irregular.	None.

COMMENTS: Variable alteration 5%-80%, averaging 20%. Point count avoided the gabbroic xenolith. Plagioclase grains have a variety of zoning patterns: 1) most have 50-micron rims followed by a weak oscillation zone (200 micron) and a zone of glass inclusions (<10 microns) in the core; 2) plagioclase in plagioclase-dominated glomerophytic clusters contains rare inclusions and a normally zoned rim with minor oscillations; 3) a subhedral (4 mm long) grain cut by edge of thin section contains altered glass and mineral inclusions; 4) plagioclase in a "xenolith" (1.5 mm) has rare inclusions, and variable (absent to normal) zoning. Serpentine texture is hourglass, recrystallized partially to interpenetrating antigorite. Some chlorite and actinolite overprints serpentine. Subrounded quartz grains are included in some serpentinized olivine and some partially replaced plagioclase.

SITE 504

140-504B-186R-01 (Piece 10,53-57 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 213

ROCK NAME: Moderately pyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.2	0.26-1.39		Equant, euhedral.	
Plagioclase	1.2	1.2	1.54-2.61		Subhedral, skeletal.	
Clinopyroxene	1.4	1.4	0.93-2.20		Anhedral.	
GROUNDMASS						
Plagioclase	30.6	53.0	?	?		
Clinopyroxene	12.8	41.4	?	?		
Granophyre	0.2	0.2	?	?		
Chromite	Tr	Tr	0.02-0.10		Subhedral, euhedral.	Chromite is included in megacrystic and contains thin magnetite rim. Small grains occur in chlorite alteration and in plagioclase.
Opaque minerals	4.0	1.6	0.41-0.28		Anhedral, euhedral, skeletal.	Extensively altered to titanite, included in plagioclase. Contain exsolution of ilmenite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.2	Plagioclase.				Interstitial, in fractures.
Albite	7.8	Plagioclase.				Forms up to 50% replacement after plagioclase in the alteration halos.
Actinolite	35.2	Pyroxene, vein.				Completely replaces pyroxene in the alteration halos.
Titanite	1.8	Titanomagnetite.				Interstitial and replacing titanomagnetite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Minerals do not exhibit a preferred orientation, but curved plagioclase laths suggest magmatic-stage deformation. Plagioclase phenocrysts form grains up to 3x4 mm, anhedral, with a 100-micron rim with weak oscillatory zoning and chrome spinel in core. Other smaller (1.3x0.5) phenocrysts have homogeneous cores and 100-micron normally zoned rims. Spinel occurs as a single 200x200-micron euhedral, reddish-brown grain with a 50x20-micron plagioclase inclusion. Plagioclase also forms coarse symplectic intergrowths with pyroxene. There are three generations of veins. The widest vein (1.5 mm) is composed of greenish amphibole forming well-developed needles and minor amounts of a colorless, weakly-birefringent mineral. In the alteration halo around this vein the rock is extensively altered (70%), and the alteration zone is dominated by amphibole.

140-504B-186R-01 (Piece 13B, 81-84 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 213

ROCK NAME: Moderately olivine-plagioclase diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic, ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.0	0.58-0.3		Equant, euhedral.	
Plagioclase	2.0	2.0	1.65-2.32		Elongated thick laths.	
Clinopyroxene	2.0	2.0	0.20-1.74		Anhedral.	
GROUNDMASS						
Sulfide minerals	Tr	?	?		Equant.	2-10 microns in size, pyrite and chalcopyrite as inclusions in plagioclase and titanomagnetite.
Granophyre	Tr	1.4	?	?		
Plagioclase	29.6	49.4	?	?		
Clinopyroxene	15.8	40.2	?	?		
Opaque minerals	1.8	2.0	0.26-0.50		Equant, subhedral, skeletal.	Titanomagnetite grains altered to titanite and contain exsolution lamellae.
SECONDARY MINERALOGY						
Chlorite	5.4	REPLACING/ FILLING Olivine, plagioclase.				COMMENTS Fills pores, partially replaces plagioclase along cracks.
Albite	14.0	Plagioclase.				Along grain boundaries and fractures.
Actinolite	28.8	Clinopyroxene, olivine.				Fills pores.
Titanite	1.6	Titanomagnetite.				
Pyrite	Tr	Interstitial, albite.				2-10 microns in size, anhedral.
Chalcopyrite	Tr	Interstitial.				2-15 microns in size, as inclusions in altered plagioclase, anhedral.
VESICLES/ CAVITIES						
Vein	?	LOCATION ?	SIZE (mm) 0.4	FILLING Actinolite.	SHAPE ?	COMMENTS Actinolite vein with extensively altered 3-mm halo rimming the vein.

COMMENTS: Plagioclase and pyroxene form symplectic intergrowths. Augite glomerocryst encloses plagioclase.

SITE 504

140-504B-187R-01 (Piece 2,5-9 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 214

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic, cryptocrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Crypto-crystalline	76.0	76.0	?	?		
Plagioclase	9.2	9.2	0.07-0.67		Laths.	Microclites.
Clinopyroxene	8.4	8.4	?		Fibrous.	Microcrystalline.
Opaque minerals	6.4	6.4	0.01-0.24		Subhedral, skeletal.	Up to 40 microns in size, magnetite grains.
Pyrite	Tr	Tr	?	?		Aggregates and porous grains.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
None.						

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Sample is unaltered. Plagioclase phenocrysts are 0.5x0.5 mm, unzoned, and generally free of inclusions.

140-504B-187R-01 (Piece 3,11-14 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 215.

ROCK NAME: Moderately plagioclase-clinopyroxene phyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.6	2.0	0.29-0.64		Subhedral.	Partially altered, weakly zoned.
Clinopyroxene	0	0.4	1.62	Augite.	Euhedral prisms.	Completely altered.
GROUNDMASS						
Plagioclase	32.4	53.0	0.04-0.16		Fine laths.	Acicular to skeletal.
Clinopyroxene	9.4	43.6	0.06-0.14	Augite.	Anhedral, granular.	Quench textured, altered.
Opaque minerals	1.2	1.0	0.03-0.13		Equant, skeletal.	Partially altered to titanite.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	4.2	?				Interstitial, veins.
Actinolite	52.0	Clinopyroxene.				Veins.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdule	?	?	1.5	See Comments.	?	Laumontite, actinolite,
Vein	?	?	0.1	Actinolite,	?	titanite?
				chlorite.		

COMMENTS: Contact between two chill zones. One cryptocrystalline and one microcrystalline. Actinolite and chlorite veins are included in point count. Patch or vug (1.5-mm) with mosaic laumontite enclosing actinolite needles and coarse-grained titanite or epidote(?) in host rock (not chilled margin).

140-504B-187R-01 (Piece 6,24-27 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 215

ROCK NAME: Moderately pyroxene-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, cryptocrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	?	3.8	0.72-1.16		Euhedral thick plates.	
Clinopyroxene	?	6.0	1.58-2.61		Euhedral, anhedral.	
GROUNDMASS						
Plagioclase	18.2	?	0.20		Laths.	
Clinopyroxene	6.4	?	0.11		Short prism, granular.	
Opaque minerals	1.0	?	0.07		Anhedral, skeletal.	Magnetite is extensively altered to titanite (90%).
Groundmass	?	90.2	?	?		
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	9.8	Olivine.				Fills interstices with actinolite.
Albite	13.8	Plagioclase.				
Actinolite	49.0	Clinopyroxene, olivine.				Associated with chlorite, filling pore space.
Pyrite	Tr	Silicate minerals.				Rarely associated with titanite replacing magnetite (5-50 micron porous grains).
Magnetite	Tr	Olivine.				Associated with chlorite and actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Fine-grained rock close to dike margin. Network of chlorite+actinolite+albite veins (50-300 micron wide). "Brecciated dike margin" of Legs 83 and 111 terminology. Partially resorbed clinopyroxene megacryst (or xenocryst) including olivine and euhedral plagioclase grains. Plagioclase forms strongly twinned (0.7x0.3 mm), subhedral grains in which zoning is not apparent. Augite contains euhedral plagioclase inclusions (100-400 microns in size), contains round inclusions (now altered and up to 300 microns in size), and is unzoned. The largest grain measures 2.5x1.44 mm, and is typical of other grains.

SITE 504

140-504B-188R-01 (Piece 7A, 21-23 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 217.

ROCK NAME: Moderately plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.64-0.93		Skeletal, equant.	Replaced by chlorite, magnetite, and actinolite.
Plagioclase	1.0	1.0	0.78-1.83		Euhedral, subhedral clots.	Zoned.
Clinopyroxene	1.0	1.0	0.67-2.18	Augite.	Euhedral prisms.	Generally inclusion poor, with one melt inclusion(?). Weakly pleochroic.
GROUNDMASS						
Plagioclase	41.8	51.8	0.2-1.0		Subhedral.	Weakly skeletal.
Clinopyroxene	18.0	37.8	0.15-0.40	Augite.	Anhedral.	Subophitic.
Opaque minerals	3.8	3.4	0.05-0.16		Equant, subhedral to skeletal.	Partially altered to titanite, and as inclusions in plagioclase.
Pyrite+ chalcopyrite	Tr	Tr	0.002-0.03		Anhedral, round.	Interstitial albite+quartz, inclusions in plagioclase.
Quartz+albite	4.6	4.0	?		?	Interstitial with apatite.
SECONDARY MINERALOGY						
Chlorite	PERCENT 2	REPLACING/FILLING Olivine.				COMMENTS Partially replacing plagioclase along cracks, interstitial.
Albite	6	Plagioclase.				
Actinolite	21.8	Clinopyroxene, olivine.				Interstitial, associated with chlorite.
Pyrite	Tr	Silicate minerals.				Anhedral (60-100 microns), porous.
VESICLES/CAVITIES						
Vesicles	PERCENT 0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

COMMENTS: Plagioclase forms a glomerophytic cluster with 200-micron, rare altered olivine. Plagioclase zoning patterns include the following: 1) normally zoned, with 50-micron rims and no inclusions; 2) phenocryst (1x0.9 mm) with a single 100-micron irregularly altered inclusion, concentric oscillatory zoning and an outer rim of 50 microns, oscillatory zone of 150 microns and a 600 micron uniform core; 3) phenocryst (0.6x0.6 mm) with 50-micron-wide rim, weak oscillations for another 50 microns, and a concentric zone of <10 micron-altered glass inclusions in the core; and 4) phenocryst (1.5x1 mm) with 100-micron, round or long, altered glass inclusions, with rim and oscillations similar to (3) above.

140-504B-189R-01 (Piece 4,13-16 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	1.89		Equant, euhedral.	
Plagioclase	2.0	2.0	1.27-1.57		Subhedral laths.	
Clinopyroxene	1.0	1.0	0.46-1.74		Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	48.2	50.6	?		Subhedral laths.	
Clinopyroxene	28.2	40.6	?		Subhedral, anhedral.	
Opaque minerals	2.6	1.4	0.18-0.23		Subhedral, euhedral, skeletal, euhedral.	Magnetite is extensively altered to titanite, forms graphic grains in groundmass.
Groundmass minerals	4.4	0.6	?		Interstitial quartz and feldspar.	
Pyrite	Tr	Tr	0.001-0.050	FeS	Globules.	Inclusions in plagioclase, pyroxene, and interstitial with chalcopyrite and magnetite.
SECONDARY MINERALOGY						
Clays	0.8	REPLACING/FILLING Olivine.				COMMENTS With magnetite, talc, serpentine, pyrite, and chalcopyrite. Interstitial and fracture-filling.
Chlorite	3.8	Olivine, plagioclase.				
Albite	0.4	Plagioclase.				
Actinolite	10.6	Clinopyroxene.				
Titanite	0.2	Magnetite.				
Talc	0.8	Olivine.				With magnetite.
Serpentine	0.4	Olivine.				With talc and magnetite.
Pyrite/ Chalcopyrite	Tr	Olivine.				Pyrite (20-100 microns) replacing silicate minerals and as an interstitial phase.
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

COMMENTS: Plagioclase phenocrysts characteristically have a 100-micron rim. There may be minor weak oscillations inside the rim, however, oscillations may be absent. The minor weak oscillations and absence of oscillations is characteristic of this unit only. Augite forms subhedral grains with plagioclase included in core and rim. Sample contains a 0.6-mm-wide chlorite-actinolite vein with associated 1-mm-wide alteration halo of actinolite, chlorite, albite, and titanite. The rock is slightly altered (10%) and the alteration halo is extensively recrystallized (70%).

SITE 504

140-504B-189R-01 (Piece 21A, 96-99 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-olivine-pyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.29-1.02		Equant, subhedral.	Olivine is altered to talc+chlorite+magnetite.
Plagioclase	4.6	4.6	0.52-1.33		Subhedral laths.	
Clinopyroxene	0.8	0.8	0.29- .07		Subhedral anhedral.	Clinopyroxene is altered to actinolite, sector zoned.
GROUNDMASS						
Plagioclase	44.0	46.4	?		?	
Clinopyroxene	26.6	43.8	?		?	
Granophyre	7.2	?	?		Granophyre.	Interstitial. Quartz-ablite intergrowths.
Opaque minerals	2.0	3.4	0.13-0.25	?	Equant, skeletal.	Magnetite is altered to titanite (20%-30%), exhibits granophyric texture.
Pyrite+ chalcopyrite	Tr	Tr	?		Anhedral as inclusions in plagioclase.	
SECONDARY MINERALOGY						
Clays	?	REPLACING/ FILLING Olivine.				COMMENTS Mixed-layer chlorite with talc and magnetite replaces olivine.
Chlorite	3.0	Olivine.				
Actinolite	11.6	Clinopyroxene.				Dark green pleochroism in some grains (hornblende?).
Talc	0.2	Olivine.				Talc+magnetite+/-pyrite and mixed-layer clays.
Pyrite	Tr	Silicate minerals, olivine.				In actinolite after clinopyroxene and intergrown with chalcopyrite and magnetite.
Chalcopyrite	Tr	Silicate minerals, olivine.				In altered actinolite after clinopyroxene, intergrown with pyrite and magnetite.
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

COMMENTS: Interstices filled by quartz and plagioclase, which may be microgranophyric. Interstices are also filled with chlorite and actinolite. Proto-gabbroic, olivine-bearing clusters still contain pockets with trapped residual melt now crystallized into magnetite, clinopyroxene, and plagioclase. Some of the clots exhibit enrichment in opaque minerals. The elongated nature of some of the opaque minerals implies that they may have been derived from the same trapped liquid. Plagioclase phenocrysts exhibit 100-micron, reversely zoned rims, with 200-micron zones inside containing higher anorthite contents. Cores are unzoned and have the same composition as the rim.

140-504B-189R-01 (Piece 21B,105-106 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.5	0.44-2.32		Equant, subhedral.	
Plagioclase	0.4	0.5	1.02-3.63		Subhedral thick plates.	
Clinopyroxene	0.6	0.5	1.31-2.47		Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	43.6	52.0	0.70-1.22		Laths.	
Clinopyroxene	34.4	42.9	0.23-0.52		Subhedral, anhedral.	
Opaque minerals	3.2	3.3	0.12-0.33		Subhedral, euhedral, skeletal.	Partially to completely altered to titanite.
Interstitial	0.8	Tr	?		Granophytic.	Albite+quartz.
Pyrite+ chalcopyrite	Tr	Tr	?		?	Minor exsolution of ilmenite, inclusions in plagioclase and magnetite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	1.8	Olivine.				Interstitial.
Albite	4.0	Plagioclase.				
Actinolite	11.2	Clinopyroxene.				Interstitally, some darker green amphibole.
Pyrite	Tr	Silicate minerals.				Interstitial, anhedral, porous, vermicular, 0.01-1.0 mm in size.
Chalcopyrite	Tr	Interstitial.				In small (10-mm) chlorite vein with pyrite.
Magnetite	Tr	Olivine.				
Talc	Tr	Olivine.				Associated with chlorite and pyrite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	2 mm	Actinolite.		2-mm actinolite vein rimmed by a 5-mm, extensively altered halo. The alteration halo surrounding the vein is compound, having a 1-mm-wide inner chlorite-rich zone and a 4-mm-wide outer actinolite-rich zone.

COMMENTS: Plagioclase forms equant, 0.5x0.5 to 1.0x1.0, subhedral phenocrysts that have 100-micron-wide rims which are gradually zoned to uniform cores. Euhedral laths, 1.3x0.4 mm, forming clusters of plagioclase grains have both normal and oscillatory zoning. Augite phenocrysts have individual or clusters of euhedral inclusions at the center surrounded by a zone free of inclusions, followed by a rim in contact with plagioclase and olivine. Point count does not include vein or halo.

SITE 504

140-504B-189R-02 (Piece 3,11-13 cm)

OBSERVER:SBP

WHERE SAMPLED: Unit 218.

ROCK NAME: Moderately plagioclase-olivine-phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL (mm)	SIZE	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	0.32-2.15		Equant, euhedral.	Completely altered.
Plagioclase	1.4	2.2	1.22-2.90		Euhedral, subhedral.	Partially altered, normally zoned with euhedral core, anhedral rim, some with oscillations near the rim.
Clinopyroxene	0	0.6	1.02-2.35	Augite.	Euhedral prisms.	Partially altered.
Spinel	Tr	Tr	0.06-0.10		Anhedral.	Reddish-brown inclusions in plagioclase and olivine.
GROUNDMASS						
Plagioclase	10.4	49.6	0.29-2.96		Thick laths.	Subhedral to skeletal laths.
Clinopyroxene	2.6	44.8	0.29-0.96	Augite.	Anhedral.	Granular to subophitic.
Opaque minerals	0	0.8	0.15-0.27		Equant, skeletal.	Altered almost 100% to titanite.
Chalcopyrite	?	?	?		Anhedral.	Inclusions in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.8	Olivine, clinopyroxene.				Interstitial.
Albite	21.8	Plagioclase.				
Epidote	Tr	Interstitial.				
Actinolite	56.8	Clinopyroxene, plagioclase, olivine.				Interstitial, amygdules.
Titanite	1.2	Titanomagnetite.				
Pyrite	Tr	Olivine, silicate minerals.				Associated with chlorite (after olivine) and actinolite.
Chalcopyrite	Tr	Olivine, silicate minerals.				Associated with chlorite (after olivine?) and actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	10	Side of section.	1-5	Actinolite.	Round.	None.

COMMENTS: Extensively altered portion of section around amygdules was point counted for "Percent present". Trace anhydrite(?) replacing plagioclase. Sulfide minerals absent from point-counted area.

140-504B-189R-02 (Piece 5C,39-42 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-olivine-pyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	0.33-1.33		Equant.	
Plagioclase	3.0	3.0	1.57-3.19		Subhedral laths.	
Clinopyroxene	1.5	1.5	0.32-2.26		Anhedral.	Sector-zoned.
GROUNDMASS						
Plagioclase	49.8	52.0	?	?		
Clinopyroxene	23.7	38.7	?	?		
Opaque minerals	3.2	2.8	0.11-0.32		Anhedral, subhedral, skeletal.	Partially altered to titanite, exhibits graphic texture with albite+quartz, replaced by pyrite.
Granophyre	2.8	?	?	?		Quartz-feldspar granophyre is common.
Pyrite+ chalcopyrite	Tr	Tr	?	?		As inclusions in plagioclase.
SECONDARY MINERALOGY						
Chlorite	3.2	REPLACING/ FILLING				Interstitial.
Albite	3.6	Olivine.				
Actinolite	9.2	Plagioclase.				Associated with fine-grained magnetite.
Apatite	Tr	Clinopyroxene.				
Pyrite	Tr	Interstitial.				Partially replaces olivine.
Chalcopyrite	Tr	Magnetite, silicate minerals, olivine.				Intergrown with pyrite and magnetite.
Tr		Actinolite.				
VESICLES/CAVITIES						
Amygdules	1	PERCENT	SIZE (mm)	FILLING	SHAPE	COMMENTS
		LOCATION				
		Edge of section.	0.2-2.0	Actinolite.	Irregular.	Alteration halos (5 mm in width), rim amygdules and exhibit extensive alteration.

COMMENTS: Proto-troctolitic and plagioclase-dominated clots (up to 1.5-1.7 mm in diameter) contain primary and secondary opaque minerals. Clinopyroxene oikocrysts are rare. Clinopyroxene+plagioclase+olivine+Fe-Ti oxide minerals form clots up to 2 mm in diameter. Plagioclase phenocrysts are oscillatory zoned with 100-micron-wide reversely zoned rims.

SITE 504

140-504B-189R-02 (Piece 12,83-86 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	0.38-1.42		Euhedral, subhedral.	Completely altered to mixed-layer clay and chlorite.
Plagioclase	2.6	2.6	0.84-2.61		Subhedral laths.	
Clinopyroxene	2.0	2.0	0.51-0.91		Anhedral.	Sector-zoning and exsolution lamellae, common.
GROUNDMASS						
Plagioclase	41.6	49.4	?	?	?	
Clinopyroxene	22.0	41.0	?	?	?	
Opaque minerals	2.2	3.0	?	?	?	
Granophyre	3.2	?	?	?	?	
Pyrite+ chalcopyrite	Tr	Tr	0.002-0.020	?	?	Pyrite interstitial with magnetite and chalcopyrite, chalcopyrite as inclusions in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.4	Olivine.				Mixed-layer clay.
Chlorite	6.8	Olivine, plagioclase.				Forms along cracks and interstitially.
Albite	4.2	Plagioclase.				
Actinolite	15.0	Clinopyroxene.				Associated with fine-grained magnetite. Bright green amphibole is present interstitially.
Pyrite	Tr	Silicate minerals, magnetite.				Commonly included in plagioclase and olivine, associated with phyllosilicate minerals, forms grains 10-100 micron in size.
Chalcopyrite	Tr	Interstitial.				Inclusions in pyrite.
Magnetite	Tr	Olivine.				Associated with phyllosilicate minerals.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase occurs as 3 types: 1) normal zoning with 100-micron rim and a single concentric oscillation, 20 microns from inside edge of the rim; 2) without oscillations in transition from rim to core (both types 1 and 2 occur in the same glomerocryst and in the same grain); 3) euhedral grains with rims up to 300 microns wide, and cores with inclusions less than 10 microns in size. Clinopyroxene oikocryst (1 mm in diameter) contains plagioclase chadacrysts which fill the outer rim of the host crystal.

140-504B-190R-01 (Piece 17,75-79 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic to subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.8	0.58-2.73		Equant, subhedral.	
Plagioclase	3.8	3.8	1.42-2.32		Euhedral laths.	
Clinopyroxene	1.8	1.8	0.32-5.33		Anhedral, subhedral.	Some phenocrysts are sector zoned.
GROUNDMASS						
Plagioclase	46.6	52.0	?		?	
Clinopyroxene	27.6	39.0	?		?	
Granophyre	5.4	?	?		Microgranophyric.	Abundant interstitial quartz-actinolite intergrowths.
Opaque minerals	4.0	2.6	0.12-0.24		Subhedral, euhedral, skeletal.	Magnetite is extensively altered to titanite between exsolution lamellae.
Pyrite+ chalcopyrite	Tr	Tr	?		Anhedral.	Inclusions in plagioclase and in microgranophyre.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Olivine.				Mixed-layer clays.
Chlorite	2.0	Olivine.				
Albite	Tr	Plagioclase.				
Actinolite	8.8	Clinopyroxene.				
Titanite	Tr	Magnetite.				
Quartz	Tr	Vein.				
Pyrite, chalcopyrite	Tr	Olivine.				With chlorite, mixed-layer clays and actinolite. Trace magnetite (fine-grained) is associated with pyrite and chalcopyrite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	2	Actinolite, chlorite, quartz.	?	Actinolite (fibrous and prismatic), with minor chlorite and quartz, forms 2-mm-wide vein which is rimmed by an alteration halo, 10 mm wide, on each side of the vein. The halo (90%) alteration is composed of actinolite, albite, and titanite.

COMMENTS: Secondary mineralogy point count pertains to bulk rock (10% altered), and not to the actinolite veins or their halos. Chalcopyrite is abundant compared to other samples. Plagioclase oikocryst with a regular distribution of clinopyroxene and plagioclase chadacrysts. Clusters of plagioclase exhibit corroded cores and resorbed grain surfaces (almost 70%).

SITE 504

140-504B-190R-01 (Piece 19,95-98 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.38-1.33		Equant, skeletal.	
Plagioclase	2.5	2.5	1.48-2.96		Subhedral laths.	
Clinopyroxene	1.5	1.5	0.35-1.07		Anhedral.	Some large poikilitic crystals.
GROUNDMASS						
Plagioclase	42.5	50.1	?		?	
Clinopyroxene	28.7	39.3	?		?	
Opaque minerals	2.4	1.8	0.07-1.55		Subhedral, skeletal.	Extensively altered to titanite, and as inclusions in plagioclase.
Granophyre	3.2	1.8	?		Granophyre.	Interstitial quartz and feldspar.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	4.2	Olivine, plagioclase.				Associated with magnetite, pyrite, and chalcopyrite. Minor replacement of plagioclase.
Albite	4.2	Plagioclase.				
Actinolite	10.8	Clinopyroxene.				Associated with magnetite.
Pyrite	Tr	Olivine, silicate minerals.				Interstitial phase, porous, anhedral (10-250 microns in size).
Chalcopyrite	Tr	Silicate minerals.				Occurs as an interstitial phase and as inclusions in pyrite (5-50 microns in size). Intergrown with chalcopyrite.
Magnetite	Tr	Olivine.				Aggregates in chlorite (<1-10 microns in size).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Sample is free of glomerophytic clusters. Plagioclase forms 4 types of phenocrysts: 1) rim with sharp interior boundary, followed by an oscillatory zone, (100 microns wide), with one major and several minor oscillations and a uniform core; 2) rim up to 200 microns wide with a sharp boundary to a uniform core; 3) gradual continuous zoning core to rim; 4) gradual continuous zoning core to rims in 3), but with altered, elongate glass inclusions (100x25 microns) aligned with long axis of crystal.

140-504B-191R-01 (Piece 7B,48-51 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218.

ROCK NAME: Moderately pyroxene-olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	1.8	0.35-1.25		Equant, skeletal.	
Plagioclase	1.5	1.5	1.36-3.48		Subhedral, anhedral.	Variety of zoning types.
Clinopyroxene	3.0	3.0	1.10-1.62	Augite.	Subhedral laths.	Ophitic with exsolution.
GROUNDMASS						
Plagioclase	43.3	51.5	0.4-1.2		Subhedral.	
Clinopyroxene	23.6	38.6	0.2-0.5	Augite.	Anhedral.	Subophitic.
Quartz	0.8	0.8	?		?	Interstitial quartz-feldspar granophyre.
Apatite	Tr	Tr	?		?	
Pyrite+ chalcopyrite	Tr	Tr	?		?	In plagioclase (up to 400 microns) and magnetite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine	2.4	Olivine.				Either serpentine or mixed-layer chlorite smectite.
Talc	Tr	Olivine.				
Chlorite	5.6	Olivine.				Filling cracks in plagioclase particularly near vugs, in minor amounts at edge of vug. Particularly near vugs.
Albite	0.4	Plagioclase.				Near vugs and filling vugs.
Actinolite	17.0	Clinopyroxene.				In vugs.
Titanite.	0.4	Titanomagnetite.				
Magnetite	Tr	Olivine.				
Pyrite+ magnetite	Tr	Olivine.				Pyrite is occasionally intergrown with chalcopyrite and chalcopyrite magnetite.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	5	Throughout.	1.3	Actinolite with trace albite.	Irregular.	None.

COMMENTS: Rare plagioclase oikocrysts contain clinopyroxene and Fe-Ti oxide inclusions. Plagioclase forms 3 types: 1) largest phenocryst grain (2.5x1.2 mm, cut by edge of thin section) has four altered glass inclusions (50-100 micron), and rim (50-150 micron) with 4 oscillations inside, each separated by 60 microns, but not present on all grain rims; 2) grain (2x0.9 mm) with 200-micron abrupt rim and no oscillations; and 3) equant, subhedral grain (1-mm diameter) with normal continuous core to rim zoning. Augite forms subhedral, equant grains with plagioclase inclusions (0-100 micron) in the core surrounded by a plagioclase-free zone which is surrounded by a rim imbedded with groundmass plagioclase.

SITE 504

140-504B-191R-01 (Piece 8,60-62 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.6	0.44-1.54		Equant, euhedral.	
Plagioclase	2.4	5.2	1.22-1.45		Euhedral, subhedral.	
Clinopyroxene	0.4	1.6	0.44-2.64		Subhedral, anhedral.	Faint sector-zoning in one phenocryst.
GROUNDMASS						
Plagioclase	44.8	47.6	1.06-1.25		Thick laths/blades.	Some interstitial quartz-feldspar granophyric intergrowths.
Clinopyroxene	26.4	41.0	0.38-0.44		Anhedral.	
Opaque minerals	3.0	2.6	0.12-0.22		Equant, skeletal.	Ilmenite exsolution lamellae, partially altered to titanite.
Groundmass	2.2	0.4	?		?	
SECONDARY MINERALOGY						
Clays	Tr	REPLACING/ FILLING Olivine.				COMMENTS Serpentine(?), mixed-layer chlorite smectite(?). Interstitial.
Chlorite	7.2	Olivine.				
Albite	5.0	Plagioclase.				
Actinolite	8.6	Clinopyroxene.				Brownish actinolite common, locally bright-green amphibole is present.
Serpentine	Tr	Olivine, orthopyroxene(?).				Mesh-texture lizardite up to 200 microns.
Pyrite	Tr	Olivine.				Inclusions (20 microns in size) in clinopyroxene, and as interstitial phase.
Chalcopyrite	Tr	Interstitial.				Included in plagioclase (5-20 microns in size).
Magnetite	Tr	Olivine, orthopyroxene(?).				
VESICLES/CAVITIES						
Amygdules	Tr	LOCATION ?	SIZE (mm) 1	FILLING Actinolite, chlorite.	SHAPE	COMMENTS Irregular. Extensively altered halos (2 mm wide) rim amygdules.

COMMENTS: Megacryst or phenocryst (?) of olivine replaced by mesh-textured lizardite, serpentine, magnetite, and pyrite. One olivine grain is intergrown with orthopyroxene(?), which is replaced by bastite and magnetite. Clinopyroxene oikocrysts with euhedral to subhedral plagioclase grains penetrate the host crystal margins.

140-504B-192R-01 (Piece 1,1-3 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	2	3.0	0.44-1.31		Equant, subhedral.	Completely altered.
Plagioclase	3.0	3.0	1.08-2.06		Subhedral, skeletal.	Wide, strong oscillatory zoning.
Clinopyroxene	0.6	0.6	0.9-1.0	Augite.	Anhedral.	Subophitic.
GROUNDMASS						
Plagioclase	41.6	45.6	0.20-1.70		Euhedral.	
Clinopyroxene	27.0	42.0	0.20-0.96	Augite.	Anhedral.	Subophitic.
Chalcopyrite	Tr	Tr	0.010-0.002		Anhedral.	Inclusions in plagioclase and clinopyroxene.
Quartz	2.6	2.6	?		Anhedral.	Quartz-feldspar granophyre.
Opaque minerals	3.4	3.2	0.18-0.26		Equant to skeletal.	Altered to titanite, some as inclusions in plagioclase and augite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clays	1.6	Olivine.				Mixed-layer clay.
Chlorite	3.2	Olivine.				Associated with magnetite replacing olivine or associated with actinolite replacing interstitial grains.
Albite	5.6	Plagioclase.				
Actinolite	11.4	Clinopyroxene/brownish, dirty actinolite.				Interstitial areas bright-green amphibole.
Titanite	0.2	Titanomagnetite.				
Quartz	Tr	Olivine.				Associated with mixed-layer clay, magnetite, pyrite.
Pyrite+chalcopyrite	Tr	Olivine, interstitial.				Anhedral, pyrite 350 micron, chalcopyrite 2-50 micron.
Magnetite	Tr	Olivine.				1-10 micron, anhedral.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Small well-packed anorthositic clots with pockets of trapped liquid crystallized to augite, plagioclase, and abundant Fe-Ti oxide minerals. Plagioclase occurs as phenocrysts and 1x2-mm glomerocrysts with wider and stronger oscillatory zoning than in other thin sections. (1) A glomerophytic cluster of several grains has a circular band of dark, rounded glass inclusions (75 microns). Width and diameter are 800 microns. The largest grain in the cluster has a 1-mm-wide zone of regularly spaced oscillations about 30 microns apart. (2) 1.5x1.0 mm phenocryst with 70-micron rim and regular oscillations inside the rim about 50 microns apart. (3) 1.0x1.0 mm phenocryst with normal zoning core to rim. Zone of minor oscillations 50 microns inside rim and 50 micron wide similar to that seen in many other units. Altered inclusions about 100 micron in diameter in center of phenocryst. (4) 2x1 mm phenocryst with broad oscillations 100 micron apart and a normal rim.

SITE 504

140-504B-192R-01 (Piece 4,13-14 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 218

ROCK NAME: Moderately plagioclase-pyroxene-olivine-phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.6	0.19-1.22		Equant, euhedral.	
Plagioclase	6.2	6.2	1.15-2.81		Subhedral, anhedral.	
Clinopyroxene	1.8	1.8	0.24-3.25		Anhedral.	
GROUNDMASS						
Plagioclase	35.4	44.6	?		?	
Clinopyroxene	22.6	38.0	?		?	
Opaque minerals	0.6	1.2	0.18-0.21		Anhedral, subhedral, skeletal.	Magnetite is extensively altered to titanite.
Pyrite+ chalcopyrite	Tr	Tr	?		?	As inclusions in plagioclase.
SECONDARY MINERALOGY						
Clays	?	REPLACING/ FILLING Olivine.				COMMENTS Mixed-layer clays, chlorite, +/-magnetite, pyrite (serpentine?).
Chlorite	3.2	Plagioclase, olivine.				Vein-filling mineral.
Albite	7.8	Plagioclase.				
Epidote	3.4	Plagioclase.				Vein-filling with quartz.
Actinolite	14.4	Clinopyroxene.				
Titanite	1.2	Titanomagnetite.				
Quartz	3.4	Plagioclase.				Minor replacement of plagioclase laths.
Pyrite+	Tr	Olivine.				Pyrite interstitial with chalcopyrite and as inclusions in plagioclase.
VESICLES/CAVITIES						
Vein	?	?	2	FILLING Actinolite.	SHAPE Sharp outline.	COMMENTS Associated with alteration halo.
Vein	?	?	2	Quartz, epidote, chlorite.	?	Tapers to zero thickness and cuts actinolite vein.

COMMENTS: Plagioclase forms normally zoned altered phenocrysts (1x0.2 mm) with a 50-micron-wide rim. Plagioclase megacrysts (unzoned) contain small (0.05-0.07 mm) inclusions of plagioclase and Fe-Ti oxide minerals. Augite phenocrysts (3x1 to 1x1 mm) contain plagioclase grains (300 micron) in rim and core. Small (0.7-0.8 mm) clinopyroxene oikocryst encloses subhedral plagioclase grains. Sample is 25% altered except in halo adjacent to actinolite vein, in which the sample is >90% altered.

140-504B-193R-01 (Piece 3, 7-10 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 219.

ROCK NAME: Moderately plagioclase-olivine phyric diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.8	0.38-0.00		Euhedral, subhedral.	Altered, ophitic.
Plagioclase	3.0	3.0	1.12-2.44		Euhedral, subhedral.	Some grains are sharply terminated.
Clinopyroxene	Tr	Tr	?		?	Subophitic with inclusion-free cores.
GROUNDMASS						
Plagioclase	43.8	48.1	0.1-1.4		Euhedral.	
Clinopyroxene	28.2	42.1	0.2-1.8		Anhedral.	Ophitic.
Opaque minerals	5.4	2.8	?		Equant, skeletal.	Partially altered to titanite, as inclusions in plagioclase, some intergrown with pyrite.
Quartz	0.2	?	?		Granophyric	Intergrowths of quartz and feldspar.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine	0.8	Olivine.				Associated with talc and magnetite.
Talc	Tr	Olivine.				Associated with magnetite, serpentine, and hematite in olivine. Pseudomorphs and interstitial to plagioclase.
Chlorite	4.6	Plagioclase.				Along cracks, or rarely filling interstitial vugs.
Albite	1.6	Plagioclase.				
Actinolite	12.2	Pyroxene.				Rims small interstitial vugs, bright-green amphibole (actinolite?).
Titanite	0.2	Titanomagnetite.				Interstitial.
Magnetite	Tr	Olivine.				
Pyrrhotite	Tr	Olivine.				Pyrite and chalcocopyrite occur in trace amounts interstitially.
Pyrite+ chalcocopyrite	Tr	Interstitial.				Pyrite with chalcocopyrite overgrows titanomagnetite. Chalcocopyrite inclusions in plagioclase.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	3	Throughout.	0.5-1.5	Bright-green amphibole.	Irregular.	None.

COMMENTS: Gabbroic proto-clots show relatively high degrees of maturity (compacted, depleted in opaque minerals). Plagioclase exhibits 4 types of zoning: 1) Subhedral, rhombohedral grains (0.8x0.8 mm and coarser) with 100-micron rim followed by 2 oscillations within 50 microns of the inside edge of the rim, followed by a uniform core; 2) Subhedral phenocryst (1.5x0.8), free of complex zoning; 3) Phenocryst (1x1 mm) with weak zoning; 4) Grain (1x0.3) with broad oscillatory zones 100 microns apart. This grain is in the center of a glomerophyric cluster. The four types can be grouped into those with a sharp boundary between core and rim and those with an oscillatory boundary between core and rim (usually 2 or 3 oscillations). The oscillatory rims are considered to have formed earlier than the simple rims.

SITE 504

140-504B-193R-01 (Piece 9, 28-31 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 220.

ROCK NAME: Moderately plagioclase-clinopyroxene-phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.6	0.41-1.74		Equant, euhedral.	Completely altered.
Plagioclase	2.4	2.4	1.29-1.8		Subhedral plates.	Zoned.
Clinopyroxene	2.0	2.0	0.85-1.42		Anhedral.	Subophitic.
GROUNDMASS						
Plagioclase	30.6	53.0	0.4-1.6		Subhedral.	
Clinopyroxene	14.8	39.2	0.05-0.7		Anhedral.	Augite, subophitic.
Unknown mineral	3.6	1.6	?		?	
Opaque minerals	1.4	0.2	0.17-0.26		Equant, skeletal.	Magnetite extensively altered to titanite.
Pyrite+ chalcopyrite	Tr	Tr	0.002-0.26		Anhedral.	Inclusions in plagioclase, and as interstitial phase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	6.4	Olivine.				
Albite	13.0	Plagioclase.				
Actinolite	23.8	Clinopyroxene.				Associated with micron-sized magnetite.
Titanite	2.0	Titanomagnetite.				
Pyrite	Tr	Olivine, titanomagnetite.				Interstitial and as overgrowths on titanomagnetite (5-20 microns).
Chalcopyrite	Tr	Olivine, plagioclase.				Interstitial (2-3 microns) and in albite after plagioclase.

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	10	Throughout.	0.4-1.0	Actinolite, chlorite.	Irregular.	Extensively altered halos, rim vugs.

COMMENTS: Plagioclase phenocrysts with zoned rim (50-100 micron), or normal gradual zoning from core to rim, or mild oscillations inside the rim. Plagioclase phenocrysts also form as 1) grains (0.6x0.2 mm) with smooth zoning from core to rim; 2) grains (1.5x1.5 mm) with 50-micron-wide rim, then 50-micron-wide oscillatory zone, and inside that a uniform core, and rare altered glass inclusions, 3) oikocryst (2 mm), with augite and altered olivine, has 300-micron rim and slight oscillations. Augite commonly forms grains (0.5x0.5 mm) that do not exhibit zoning or oscillations, with plagioclase embedded in rim, and similar grains with a 50-micron zoned rim and sector zoning.

140-504B-193R-01 (Piece 13A, 44-46 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 220.

ROCK NAME: Moderately plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microgranular groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.4	0.73-0.90		Equant, euhedral.	Completely altered.
Plagioclase	2.0	2.4	0.58-1.77		Subhedral.	Normally zoned with 100-micron rims.
Clinopyroxene	0.2	2.0	0.99-1.60	Augite.	Anhedral.	Rare plagioclase inclusions, most are inclusion free, partially altered.
GROUNDMASS						
Plagioclase	26.8	52.2	0.44-1.50		Thick laths.	
Clinopyroxene	9.4	40.0	0.2-0.61	Augite.	Subhedral, anhedral.	Subhedral to intersertal, partially altered.
Opaque minerals	1.4	2.0	0.10-0.33		Equant, skeletal.	Magnetite 90% altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	6.4	Olivine, plagioclase.				Interstitial.
Albite	18.6	Plagioclase.				
Actinolite	35.2	Clinopyroxene.				Interstitial.
Titanite	Tr	Titanomagnetite.				
Prehnite	0.4	Plagioclase.				
Anhydrite	Tr	Plagioclase.				

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.4-0.8	See comments.	?	Epidote, actinolite, chlorite vein.

COMMENTS: One well-compacted pyroxenitic, syngenetic clot.

140-504B-194R-01 (Piece 2, 5-9 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 220.

ROCK NAME: Moderately olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	5.4	0.26-1.97		Equant, euhedral.	Completely altered.
Plagioclase	3.0	3.0	0.96-2.49		Subhedral, thick plates.	Variety of zoning patterns.
Clinopyroxene	0.5	0.5	0.38-2.80	Augite.	Anhedral, prismatic.	Some sector-zoned, poikilitic.
GROUNDMASS						
Quartz	1.2	?	?		?	Quartz-feldspar granophyre.
Pyrite+ chalcopyrite	Tr	?	?		?	As inclusion in plagioclase and magnetite.
Plagioclase	42.2	51.4	0.2-0.7		Subhedral.	
Clinopyroxene	31.3	37.5	0.2-0.4		Subhedral to anhedral.	Subophitic.
Opaque minerals	2.8	2.2	0.18-0.27		Equant, skeletal.	Altered to titanite (30%-50%).
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine(?)	5.2	Olivine.				Serpentine or mixed clays. Associated with magnetite and pyrite.
Chlorite	3.6	Plagioclase.				Along cracks.
Albite	0.5	Plagioclase.				
Actinolite	9.4	Clinopyroxene.				Locally bright-green (composition other than actinolite?).
Titanite	0.4	Titanomagnetite.				
Magnetite	Tr	Olivine.				Associated with serpentine (or mixed clays) and chlorite.
Pyrite	Tr	Olivine, silicate minerals.				And in albite-quartz aggregates.
Chalcopyrite	Tr	Olivine, silicate minerals.				In association with actinolite and altered olivine.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	2	Throughout.	0.2	Bright-green amphibole.	Irregular.	Interstitial areas.
Vein	?	?	?	?	?	Plucked out during preparation.

COMMENTS: Plagioclase: (1) Subhedral phenocryst (1.2x1.0 mm), with 0.2-mm rim. (2) Anhedral, normally zoned phenocryst (1.2x0.8 mm). (3) Euhedral rhomboid, 0.9x0.7 mm, with 50- to 100-micron rim. Normally zoned with minor weak oscillations. (4) Subhedral grain (1.2x0.3 mm) with 50- to 150-micron-wide rim and four oscillations. Other grains in the same glomerocryst exhibit no oscillations; 5) euhedral phenocryst (2x1 mm) with 200-micron rim and oscillations 200 microns farther into core; 6) euhedral phenocryst (2x1 mm) with augite intergrown on rim. (7) Phenocryst (1.4x0.8 mm) with sharp rim. Augite: (1) Phenocryst (1.8x1.2 mm) including plagioclase grains up to 200 microns. (2) Poikilitic. (3) Zoned grain (2.2x0.8 mm) with plagioclase within 200 microns of rim. (4) Euhedral phenocryst (0.8x0.6 mm) with 50-micron rim.

SITE 504

140-504B-194R-01 (Piece 18,95-96 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 220.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.29-0.31		Equant, euhedral.	Completely altered.
Plagioclase	0.5	0.6	0.84-1.48			Subhedral, euhedral. Partially altered, normal zoning with uniform core and oscillatory mantle.
Clinopyroxene	0.2	0.2	1.57	Augite.	Euhedral prisms.	Unaltered, ophitic.
GROUNDMASS						
Plagioclase	25.9	52.4	0.49-1.45		Thick laths, blades.	Some slight oscillatory zoning.
Clinopyroxene	5.8	45.6	0.20-0.64	Augite.	Anhedral.	Altered, granular to subophitic.
Opaque minerals	0.6	1.2	?		Equant, subhedral.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.8	Olivine.				Interstitial.
Albite	15.4	Plagioclase.				
Actinolite	45.8	Clinopyroxene.				Interstitial, amygdules.
VESTICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	
Amygdules	5	Throughout.	0.2-2.0	Actinolite.	Irregular.	

COMMENTS: Amygdules are included in the point count.

140-504B-194R-01 (Piece 22,115-118 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 220.

ROCK NAME: Moderately olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	3.0	0.35-0.64		Equant, subhedral.	
Plagioclase	1.6	1.6	1.02-1.45		Subhedral thick plates.	
Clinopyroxene	1.0	1.0	0.35-1.94		Subhedral, anhedral.	Augite forms equant ophitic crystals with plagioclase cores.
GROUNDMASS						
Plagioclase	46.2	51.0	2-1.0		Subhedral.	
Clinopyroxene	29.0	36.4	0.2-0.8	Augite	Anhedral.	Ophitic, sector-zoned.
Opaque minerals	4.0	3.2	0.2-0.22		Equant, skeletal.	Relatively unaltered magnetite.
Quartz	4.0	3.8	?	?	?	Plagioclase and quartz microgranophyre.
Pyrite+ chalcopyrite	Tr	Tr	0.2		Anhedral.	Included in plagioclase and magnetite.
SECONDARY MINERALOGY						
Chlorite	1.0					Associated with magnetite and pyrite.
Albite	Tr					
Actinolite	13.2					Interstitial actinolite is bright green, after clinopyroxene is pale green and forms well-developed crystals (actinolitic hornblende?).
Pyrite	Tr					Interstitial up to 100 microns, anhedral +/- chalcopyrite inclusions, and as overgrowths on titanomagnetite.
Chalcopyrite	Tr					Inclusions in plagioclase, interstitial with pyrite.
Magnetite	Tr					
VESICLES/CAVITIES						
Vesicles	0					None.

COMMENTS: Plagioclase: (1) Phenocrysts (0.6x0.5 mm) with 50-micron rim and zone of smooth variation inside rim, contains altered inclusions. (2) Rounded (0.5x0.5 mm), anhedral inclusion in pyroxene is zoned where it touches groundmass but relatively unzoned where it is in contact with pyroxene. This grain also contains an altered patch (150 microns wide) and round 25- to 50-micron inclusions containing altered material that may have been glass. (3) Phenocryst (1.3x0.5 mm) with elongate (100x25 microns) altered inclusions aligned with long axis of crystal. Rim is zoned and about 50 microns wide. Augite phenocrysts (1.5x2 mm) have 50-micron-wide rim and uniform interior and also contain euhedral plagioclase (300x100 microns).

SITE 504

140-504B-195R-01 (Piece 3, 7-10 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 221.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.2	0.58-3.57		Euhedral, skeletal.	
Plagioclase	9.0	8.6	0.06-1.16		Euhedral, subhedral.	Unzoned.
Clinopyroxene	10.0	5.8	0.07-1.17		Euhedral, subhedral.	Some grains may be coarse-grained groundmass, microphenocrysts.
Opaque minerals	3.0	1.8	0.02-0.16		Equant, euhedral.	
GROUNDMASS						
Groundmass	73.2	83.6	?		?	Microcrystalline.
Minerals						
SECONDARY MINERALOGY						
Clay minerals	?	REPLACING/ FILLING Olivine.				COMMENTS Mixed-layer, associated with pyrite (chilled margin).
Chlorite	2.6	Vein plagioclase.				Chilled margin, pyroxene, amygdules, (diabase).
Albite	0.6	Plagioclase.				Chilled margin.
Epidote	?	Vein.				With chlorite and prehnite (chilled margin).
Actinolite	1.4	Pyroxene.				Interstitial (diabase).
Titanite	0.2	?				Interstitial.
Anhydrite(?)	Tr	Plagioclase.				Chilled margin.
Prehnite	?	Vein.				With chlorite and epidote (chilled margin).
VESICLES/CAVITIES						
Veins	?	LOCATION ?	SIZE (mm) 1	FILLING See comments.	SHAPE ?	COMMENTS Chlorite, epidote, prehnite vein. Prehnite formed prior to chlorite(?).

COMMENTS: Point counting only includes the chilled margin, not the vein or diabase. Olivine phenocrysts (4.4x2.2 mm) are altered, and euhedral; skeletal olivine enclosed (1.4x0.8 mm) euhedral, unzoned plagioclase with concentric zone of altered glass inclusions that extends from 100-200 microns inside the rim. Some altered glass inclusions also are in core of phenocrysts. Olivine has 1-mm round altered glass inclusions. Typical augite phenocryst in this section is euhedral, sector-zoned, 0.65x0.4 mm, and contains plagioclase laths (200x50 micron) in the rim. Some phenocrysts are rounded and subhedral. Serpentine also occurs after olivine, as does pyrite with mixed-layer clays.

140-504B-196R-01 (Piece 1,0-3 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 221

ROCK NAME: Moderately plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.8	2.4	0.50-0.78		Subhedral thick plates.	
Clinopyroxene	0.6	1.6	0.15-3.01		Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	51.6	50.8	0.15-0.40		Laths.	
Clinopyroxene	38.0	38.4	0.05-0.19		Subhedral, anhedral.	Corroded and partially altered to actinolite.
Opaque minerals	2.2	6.8	0.02-0.05		Equant, euhedral.	Partially altered to titanite.
Olivine	?	?	0.05-0.16		Equant.	
Pyrite	Tr	Tr	?		?	Included in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.4	Plagioclase.				As interstitial phase, mixed-layer chlorite-smectite.
Chlorite	3.4	Plagioclase, olivine(?).				Interstitial.
Albite	1.0	Plagioclase.				
Actinolite	0.4	Clinopyroxene.				
Titanite.	1.6	Titanomagnetite.				
Pyrite	Tr	Silicate minerals.				Interstitial, overgrowth on titanomagnetite, and intergrown with 10-micron chalcopyrite grains.
Chalcopyrite	Tr	Interstitial.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase forms rare phenocrysts in augite-plagioclase cumulate xenolith and as euhedral to subhedral laths (0.2x0.5) with narrow (10 micron) zoned rims. Augite forms euhedral to subhedral phenocrysts (1x0.4 mm) with euhedral plagioclase laths, mostly enclosed within the rims.

SITE 504

140-504B-196R-01 (Piece 9,39-42 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 222.

ROCK NAME: Highly plagioclase-clinopyroxene-phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.2	0.35-0.90		Equant, subhedral.	Completely altered.
Plagioclase	6.4	6.4	1.31-2.15		Subhedral.	Variety of phenocryst types.
Clinopyroxene	2.4	2.4	1.45-1.60		Subhedral, anhedral.	Augite, unzoned without plagioclase inclusions, and zoned with plagioclase inclusions in rim.
GROUNDMASS						
Plagioclase	35.0	46.4	0.87-1.49		Laths.	
Clinopyroxene	28.6	40.0	0.26-0.64		Anhedral.	Subophitic.
Opaque minerals	4.6	3.6	0.49-0.96		Euhedral, skeletal.	Magnetite is partially altered to titanite.
Quartz	0.2	?	?		Anhedral.	
Pyrite+ chalcopyrite	Tr	Tr	?		?	In plagioclase, chalcopyrite is also in magnetite.
SECONDARY MINERALOGY						
Chlorite	4.4			REPLACING/FILLING Olivine, plagioclase.		COMMENTS In olivine associated with magnetite, mixed-layer clays, minor talc, and pyrite.
Albite	1.8			Plagioclase.		
Actinolite	16.2			Clinopyroxene.		Brownish "dirty" needles partially replacing clinopyroxene, color is mostly dark green to brown.
Titanite	0.4			Titanomagnetite.		Interstitial.
Quartz	?			Olivine.		
Magnetite	Tr			Olivine.		Associated with mixed-layer clays.
Pyrite+	Tr			Interstitial.		In talc, tremolite, chalcopyrite and altered groundmass.
VESICLES/CAVITIES						
Amygdules	5			LOCATION Throughout.	SIZE (mm) 0.05-0.1	FILLING Bright-green amphiboles.
					SHAPE Irregular.	COMMENTS None.

COMMENTS: Low sulfide content. Plagioclase occurs as 5 types: 1) Anhedral, unzoned phenocryst (1.6x1.6 mm) has interconnected irregular patches of glass altered to clay. 2) The coarser-grained groundmass grains have 100-micron normally zoned rims and are free of glass inclusions. 3) Large phenocryst is reversely zoned with oscillations and glass inclusions. 4) Numerous grains, less than 1 mm in maximum dimension, that are normally zoned with oscillations inside the rim. 5) Plagioclase oikocryst with plagioclase, augite, and magnetite inclusions.

140-504B-197R-01 (Piece 22,99-101 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 222

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	1.4	0.20-1.74		Euhedral, equant.	Completely altered.
Plagioclase	4.6	4.6	0.58-1.74		Subhedral.	
Clinopyroxene	Tr	Tr	0.15-0.90		Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	30.8	51.6	?		?	
Clinopyroxene	30.4	38.8	?		?	Subophitic.
Opaque minerals	?	3.6	?		?	
Opaque minerals	4.6	3.6	0.07-0.23		Equant, skeletal.	Magnetite alters to titanite, ilmenite exsolution lamellae in magnetite.
Pyrite+ chalcopyrite	Tr	Tr	?		Anhedral.	In plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Zeolites	?	Plagioclase.				Along cracks.
Chlorite	3.4	Olivine, interstitial vugs.				Associated with magnetite.
Albite	7.8	Plagioclase.				
Actinolite	18.4	Pyroxene, interstitial areas.				Brownish-green in clinopyroxene and brownish-green or bright green in interstitial areas.
Magnetite	Tr	Olivine.				Associated with chlorite replacing olivine.
Pyrite+ chalcopyrite	Tr	Silicate minerals, olivine.				Associated with mixed-layer clays and magnetite or chlorite and actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	5	Throughout.	?	Actinolite or chlorite.	Irregular.	Interstitial areas.
Veins	?	?	?	Brownish-green actinolite needles.	?	Textures suggest multiple openings. 5-mm-wide alteration halos are compound (dark inner zone, light outer zone), with 70% alteration (act,chl,ab).

COMMENTS: The point-counting was made in the freshest part of the rock, i.e. out of the vein and the alteration halo. In the alteration halo, plagioclase is 40%-70% altered, clinopyroxene is 100% altered, and titanomagnetite is 50% altered. Plagioclase: A large, unzoned, anhedral phenocryst (1.3x1.5 mm) and subhedral normally zoned grain (0.35x0.65 mm) typify this section. Olivine: Altered, but contains plagioclase laths (100x150 microns).

SITE 504

140-504B-197R-01 (Piece 28,131-138 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 223.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.4	0.50-2.03		Euhedral, subhedral.	Completely altered.
Plagioclase	2.8	5.0	0.55-1.45		Euhedral, subhedral.	Some with oscillatory zoning.
GROUNDMASS						
Plagioclase	45.8	49.4	0.15-1.22		Thick plates.	Branching sprays of plagioclase in poikilitic augite.
Clinopyroxene	30.0	41.2	0.58-3.42		Anhedral.	Ophitic to poikilitic.
Granophyre	0.4	?	?		?	Interstitial.
Opaque minerals	3.4	2.0	0.09-0.22		Euhedral, skeletal.	Ilmenite exsolution lamellae partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	2.0	Plagioclase, olivine.				Interstitial (mixed-layer chlorite-smectite).
Chlorite	1.6	Plagioclase.				Interstitial with actinolite.
Albite	0.8	Plagioclase.				
Actinolite	8.6	Clinopyroxene, plagioclase.				Interstitial.
Talc	4.2	Olivine, clinopyroxene.				Interstitial (0.4 mm).
Serpentine	0.4	Olivine.				
Pyrite+ chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase, pyrite overgrowths on titanomagnetite.
Magnetite	Tr	Olivine, clinopyroxene.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	5	?	0.2-1.0	Actinolite, chlorite.	Irregular.	Rimmed by 2-mm-wide alteration halos.

COMMENTS: Unusually few sulfide grains. Plagioclase, typical of this unit, forms (1.0x0.4 mm) euhedral grains with a weak oscillatory zoned core followed by a 150-micron zone with 4 concentric oscillations and a 20x40-micron zoned rim. Other types of zoning are (1) subhedral grains with oscillatory zoned cores and a 100-micron, normally zoned rim. (2) Plagioclase (1.1x0.4 mm) with 100-micron spinel inclusion in rim. Olivine forms rare phenocrysts (1.8x1 mm) with 150-micron plagioclase inclusion.

140-504B-197R-02 (Piece 6,33-38 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 223.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	4.6	0.71-3.05		Equant, euhedral.	Commonly completely altered, but one unaltered core is present.
Plagioclase	1.4	8.6	1.0-2.8		Euhedral, subhedral.	Some oscillatory zoning.
Clinopyroxene	1.0	2.6	0.73-2.90		Anhedral.	Augite is ophitic.
GROUNDMASS						
Plagioclase	45	42	0.2-2.07		Laths.	Sprays of plagioclase in poikilitic augite.
Clinopyroxene	26.0	39.6	0.03-1.07		Anhedral.	Augite is ophitic.
Opaque minerals	3.8	2.6	0.14-0.21		Equant, skeletal.	Partially altered to titanite, ilmenite exsolution lamellae.
Olivine	0	Tr	0.44		Equant, euhedral.	
Pyrite	Tr	0	?		?	Inclusions in plagioclase and clinopyroxene.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.4	Plagioclase.				
Albite	0.4	Plagioclase.				
Actinolite	16.2	Clinopyroxene.				Interstitial, prismatic crystals.
Talc	5.8	Olivine.				Associated with magnetite, pyrite, iron oxide minerals, and as interstitial phase with chlorite.
Serpentine	?	Olivine.				Intergrown with talc.
Pyrite	Tr	Interstitial.				As inclusions in plagioclase, clinopyroxene (10-100 microns).
Chalcopyrite	Tr	Olivine.				Intergrown with talc.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Olivine oikocrysts enclose anhedral plagioclase and clinopyroxene. Well-compacted olivine-plagioclase-augite protoclots with no trapped liquid.

SITE 504

140-504B-198R-01 (Piece 6,21-25 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 223

ROCK NAME: Highly olivine-plagioclase-clinopyroxene phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	4.4	1.65-2.41		Equant, euhedral.	
Plagioclase	1.0	3.6	1.13-2.15		Subhedral thick plates.	
Clinopyroxene	0.6	2.0	1.96-2.06		Anhedral.	Augite.
GROUNDMASS						
Plagioclase	46.0	48.2	0.52-1.30		Thick laths.	
Clinopyroxene	28.0	39.8	0.46-1.02		Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.2	2.0	0.11-0.20		Equant, skeletal.	Partially replaced by titanite.
Quenched crystals	0.2	?	?		?	
SECONDARY MINERALOGY						
Clays	PERCENT 0.4	REPLACING/FILLING Olivine.				COMMENTS Olivine cores rimmed by talc. Clay is likely a mixture of mixed layer-smectite and talc.
Chlorite	1.6	Olivine.				Interstitial, at center of small actinolite vein.
Albite	1.2	Plagioclase.				
Actinolite	16.0	Clinopyroxene.				
Quartz	0.4	?				
Talc	2.2	Olivine.				Associated with magnetite and as interstitial phase.
Pyrite, chalcopyrite	Tr	Olivine, plagioclase.				Interstitial and as inclusions in plagioclase (10-150 microns).
Magnetite	Tr	Olivine.				Associated with talc (<1-10 microns).
VESICLES/CAVITIES						
Vein	PERCENT ?	LOCATION ?	SIZE (mm) 0.3	FILLING Actinolite.	SHAPE ?	COMMENTS Actinolite vein with 2-mm alteration halo merges with 0.1-mm actinolite+chlorite vein.
Vein	?	?	0.1	Chlorite, actinolite.	?	

COMMENTS: Clinopyroxene and plagioclase oikocryst contains plagioclase, clinopyroxene, and Fe-Ti oxide inclusions. Cumulate plagioclase-dominated clot with sharp zoning. Plagioclase exhibits complex zoning within a single crystal. A 4.4-mm-wide plagioclase glomerocryst cut by edge of slide, has a 200-micron normally zoned rim followed by a 2-mm-wide homogenous zone, a 0.4-mm-wide oscillatory and reversely zoned region, and a uniform core. A second, euhedral crystal has a normally zoned rim with 2 oscillatory zones inside the rim and a uniform core with altered glass inclusions. Plagioclase contains spinel inside the oscillatory zoned rim. Augite forms 1.6-mm equant, anhedral grains with plagioclase inclusions. One augite contains a 50-micron inclusion of spinel.

140-504B-198R-01 (Piece 16,61-64 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 224

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Porphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1	1.8	0.29-2.61		Equant, euhedral.	Partly or completely altered to talc, magnetite, and minor serpentine.
Plagioclase	1.8	4.4	0.67-3.02		Subhedral, thick plates.	
GROUNDMASS						
Crypto-crystalline	?	2	?		?	
Plagioclase	43.4	47.4	0.52-1.8		Laths.	
Clinopyroxene	33.8	41.6	0.52-1.45		Anhedral to subhedral.	Altered partly to actinolite.
Opaque minerals	2.6	2.8	0.11-0.23		Equant, anhedral.	Magnetite altered to titanite (20%).
Pyrite+chalcopyrite	Tr	Tr	?		?	Inclusion in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	1	Interstitial.				With actinolite in interstitial patches.
Actinolite	14.2	Clinopyroxene.				After clinopyroxene, and with chloride in interstitial patches.
Talc	3.2	Olivine.				Associated with magnetite and pyrite in interstitial patches.
Magnetite	Tr	Silicate minerals, olivine.				Fine-grained, associated with actinolite-chlorite alteration of silicate minerals.
Pyrite+chalcopyrite	Tr	Silicate minerals, olivine.				Porous, anhedral grains and small stringers, enclosing altered silicate minerals.
VESICLES						
CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Different types of zoning in plagioclase megacrysts and phenocrysts. Some feldspar megacrysts have resorbed surfaces, which is evidence for partial re-equilibration under different conditions. Plagioclase: Typical features of phenocrysts are subhedral shape with 50-micron normally zoned rim containing one oscillation, a uniform core with 50-micron glass inclusions. Some normally zoned grains have numerous oscillations. The groundmass plagioclase is unzoned. Olivine: 2-mm grain with altered rim and a 30-micron chrome spinel grain in the rim.

140-504B-198R-01 (Piece 18, 70-71 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 224.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
Plagioclase	36.2	51.4	0.30-0.56		Laths.	Some with skeletal morphology.
Clinopyroxene	0	46.0	0.14-0.26		Anhedral to subhedral.	Altered completely to actinolite. Ophitic to subophitic.
Opaque minerals	2.6	2.2	0.06-0.18		Equant to skeletal.	Altered to granular clumps, relict skeletal arrangement mostly only some ilmenite exsolution lamellae preserved from magnetite altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	0.8	?				Intergrown with actinolite (blue birefringence).
Actinolite	60.4	Interstitial.				
Pyrite	Tr	Interstitial.				Associated with actinolite and chlorite (only 6 grains).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.
Vein	?	?	?	Amphibole,	?	

COMMENTS: Point count of rock not in halo of vein. Veins: Multiple generations of amphibole+chlorite veining; crosscutting. Early vein has 6 mm-wide halo on each side. Point count of halo: clear plagioclase - 21.5%; "dirty" plagioclase (with inclusions of chlorite and fluid inclusions) - 32.3%; chlorite - 31.6%; actinolite - 9.8%; opaque minerals - 4.8%. Chilled margin (aphanitic, spherulitic) at one end of section is crosscut by vein.

SITE 504

140-504B-199R-01 (Piece 17, 71-76 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 226.

ROCK NAME: Highly olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Glomerophorphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	9.4	0.35-2.78		Equant, euhedral.	Partly altered to talc, talc-smectite, and serpentine.
Plagioclase	4.4	7.2	0.75-2.84		Euhedral-subhedral.	
Clinopyroxene	0	2.4	1.6-2.9		Subhedral-anhedral.	Ophitic.
GROUNDMASS						
Plagioclase	48.6	39.8	0.64-1.45		Laths.	Branching plagioclase laths in poikilitic augite.
Clinopyroxene	30.0	39.0	0.81-1.45		Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.8	2.2	0.10-0.24		Subhedral-anhedral.	Not skeletal on the whole. Somewhat altered to titanite.
SECONDARY MINERALOGY						
Clays	Tr	REPLACING/ FILLING Olivine.				Partly replaces olivine (talc-smectite) and interstitial to plagioclase.
Chlorite	0.4	Silicate minerals.				Interstitial.
Talc	6.2	Olivine.				Associated with fine-grained magnetite+serpentine, mixed clay.
Magnetite	Tr	Olivine.				Associated with talc, pyrite, chalcopyrite.
Pyrite	Tr	Silicate minerals, interstitial, olivine.				Inclusions in plagioclase, interstitial and intergrown with magnetite.
Chalcopyrite	Tr	Interstitial, olivine, silicate minerals.				Associated with pyrite (2-20 micron).
Pyrrhotite	Tr	?				Single inclusion in plagioclase, associated with pyrite and chalcopyrite.

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

COMMENTS: Very few sulfide minerals. Well-compacted olivine-clinopyroxene-plagioclase clots. Plagioclase dominated clots with heterogeneously distributed trapped melt pockets. A 15-micron rounded pyrrhotite+pyrite+pentlandite(?) inclusion in a spinel grain. Plagioclase: Typical of this unit is euhedral grain (0.5x0.5 mm) with concentric zoning and numerous fine-scale oscillations. Oscillatory zoning is not observed in plagioclase associated with olivine megacryst. A small (groundmass?) unzoned grain contains an 80-micron red spinel. Olivine: Large (2.4 mm) megacryst with altered rim has euhedral spinel (100x150 micron) altered to magnetite on the rim. Augite: 2-mm clots contain plagioclase in an 0.8-mm-wide rim; other grains have plagioclase included in cores. Spinel: In olivine, plagioclase, and a plagioclase+augite glomerocryst.

140-504B-199R-01 (Piece 25A, 106-110 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	2.0	0.32-1.36	Fe85	Equant, euhedral.	Extensively altered to talc, serpentine, however, fresh olivine is present in some grains.
Plagioclase	6.8	7.2	0.64-2.03		Subhedral thick plates.	
Clinopyroxene	?	2.2	1.16-0.70	Augite.	Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	45.0	44.0	0.49-1.16		Laths.	Branching plagioclase in poikilitic augite.
Clinopyroxene	33.6	42.8	0.38-0.96		Anhedral, subhedral.	Ophitic to poikilitic.
Opaque minerals	1.8	1.8	?		Equant.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay Minerals	Tr	Olivine.				Brownish talc may be mixed with smectite(?).
Actinolite	7.0	Clinopyroxene.				Interstitial (bright green when interstitial).
Talc	5.4	Olivine.				After silicate minerals, with pyrite, magnetite, chalcopyrite, and as interstitial phase.
Serpentine	0.4	Olivine.				Associated with iron oxide minerals (10-30 microns).
Magnetite	Tr	Olivine.				With talc and pyrite.
Pyrite+ chalcopyrite	Tr	Olivine.				Interstitial, replacing titanomagnetite, silicate minerals (up to 150 microns).
Hematite	Tr	Olivine.				In serpentine (10- to 20-micron aggregates).
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Clots occur as 3 types: 1) Plagioclase-dominated with trapped melt pockets crystallized to magnetite and clinopyroxene; 2) proto-troctolitic with cumulate texture (orthocumulate?); 3) clinopyroxene oikocrysts with plagioclase, augite, Fe-Ti oxide minerals, and olivine (rare) inclusions. Some oikocrysts exhibit uniform distribution of plagioclase in core and magnetite rim. Plagioclase typically forms subhedral phenocrysts with a 200-micron oscillatory zoned rim with 4 oscillations and an irregular core. Rare altered glass inclusions are observed in core. Glomeroporphyritic plagioclase grains, with olivine, are subhedral to anhedral, and unzoned. Olivine occurs in glomeroporphyritic cluster with plagioclase and as subhedral phenocrysts with 150-micron altered glass inclusions. Augite distribution is similar to that in other units. Phenocrysts are subhedral, equant grains with rounded subhedral plagioclase grains in the core. Spinel in plagioclase and olivine forms euhedral (25-100 micron) inclusions in glomeroporphyritic cluster.

SITE 504

140-504B-199R-01 (Piece 26B, 121-123 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	2.2	0.20-1.45		Equant, euhedral.	Rims are partially replaced by talc.
Plagioclase	7.8	5.6	0.55-2.09		Subhedral thick plates.	Normal and patchy zoning.
Clinopyroxene	0	0.2	1.31-2.90		Subhedral, anhedral.	Ophitic augite.
GROUNDMASS						
Plagioclase	48.4	48.6	0.58-1.04		Laths.	Splays included in augite.
Clinopyroxene	33.8	41.8	0.32-1.02		Anhedral.	Augite is ophitic to oikilitic.
Opaque minerals	2.6	1.6	0.11-0.22		Anhedral, subhedral.	Titanomagnetite with ilmenite exsolution. Magnetite is partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	0.2	Plagioclase.				Interstitial.
Actinolite	4.4	Clinopyroxene.				Interstitial.
Talc	2.6	Olivine, albite.				Olivine is partially to completely replaced by talc, magnetite, and pyrite. Talc is also replacing groundmass albite.
Magnetite	Tr	Olivine.				Associated with talc.
Pyrite	Tr	Olivine.				Included in plagioclase. As stringers and intergrown with magnetite.
Chalcopyrite	Tr	Interstitial.				Intergrown with magnetite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Very few sulfide minerals. Olivine oikocrysts with plagioclase chadacrysts. Relatively well-compacted olivine-plagioclase-clinopyroxene clots. Plagioclase forms unzoned grains in glomerocrysts. Phenocrysts have 100-micron normally zoned rims. Groundmass grains are unzoned. Olivine contains inclusions of unzoned plagioclase laths in the cores. Spinel occurs as phenocrysts and as inclusions in phenocrysts and glomerocrysts. A 60-micron, euhedral grain with altered glass inclusions (20x30 microns) and an irregular, brown spinel (50 microns long) occur in plagioclase-augite glomerocrysts. A euhedral brown spinel is enclosed in olivine. Spinels have a symplectic texture where they contact groundmass.

140-504B-200R-01 (Piece 17A, 86-88 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.4	3.8	0.17-2.61		Equant to subhedral.	Partly replaced by serpentine (around fresh olivine relicts) and talc and magnetite in the external part. Microphenocrysts are totally replaced by talc and magnetite.
Plagioclase	6.6	6.6	0.64-2.87		Subhedral to laths.	
Clinopyroxene	1.8	1.8	0.32-2.90	Augite.	Anhedral.	Ophitic.
Spinel	Tr	Tr	0.1		Subhedral.	In plagioclase (chrome spinel?).
GROUNDMASS						
Quartz	0.6	?	?		?	
Pyrite+ chalcopyrite	?	?	?		?	Inclusions in plagioclase and in magnetite.
Plagioclase	42.6	49.6	0.15-0.70		Subhedral.	Branching crystals in augite.
Clinopyroxene	32.0	36.2	0.2-0.7	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.8	2.0	0.07-0.27		Subhedral, euhedral, skeletal.	Magnetite partly altered to titanite, some ilmenite exsolution lamellae.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine	0.4	Olivine.				Associated with talc/smectite, magnetite and pyrite.
Talc/smectite	8.6	Olivine.				Associated with magnetite and pyrite.
Chlorite	1.2	Plagioclase, interstitial areas.				
Actinolite	3.0	Pyroxene, interstitial areas.				Replaces pyroxene when in contact with interstitial areas.
Magnetite	Tr	Olivine.				Associated with talc/smectite.
Pyrite	Tr	Olivine, silicate minerals.				Associated with talc, serpentine, magnetite, altered groundmass (actinolite+chlorite) up to 200 microns.
Chalcopyrite	Tr	?				Associated with actinolite in altered groundmass and included in pyrite.
Hematite	Tr	Olivine.				Associate with serpentine and talc.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	3	Throughout.	?	Bright-green amphibole.	Irregular.	Interstitial areas.

COMMENTS: Clots: (1) Plagioclase-dominated clots with interstitial trapped liquid. (2) Olivine-clinopyroxene clots with equigranular mosaic texture. (3) Plagioclase-dominated clots with cumulus texture and plagioclase-augite-magnetite reactions(?) rims. Plagioclase: Unzoned or normally zoned phenocrysts are common. Largest plagioclase are free of spinel and generally free of glass inclusions. A texture not seen in the previous 2 thin sections from Unit 227 or other units is present: a subhedral grain (0.6x0.4 mm) with a 0.1-mm-wide rim followed by a 0.1-mm-wide zone of higher anorthite content filled with altered, round to elongate glass inclusions (10 to 50 microns). Spinel grains occur in unzoned plagioclase and in augite oikocrysts.

SITE 504

140-504B-200R-01 (Piece 19,105-107 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227

ROCK NAME: Moderately olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	4.8	0.67-2.11		Equant, subhedral.	Partially altered to talc, clay, pyrite, and magnetite.
Plagioclase	2.2	3.2	0.67-1.74		Subhedral thick plates.	
Clinopyroxene	1.8	1.4	1.22-2.58		Subhedral prisms.	
Spinel	Tr	Tr	0.03-0.08		Subhedral, euhedral.	Chrome spinel inclusions in talc-altered olivine.
GROUNDMASS						
Plagioclase	47.2	47.6	0.44-1.51		Laths.	Curved branching crystals in augite.
Clinopyroxene	31.2	40.6	0.29-1.38		Anhedral.	Ophitic augite.
Opaque minerals	2.6	2.2	0.07-0.24		Equant, skeletal.	Ilmenite exsolution lamellae, partially altered to titanite.
Pyrite, chalcopyrite	Tr	Tr	0.020-0.005		Anhedral.	Inclusions in plagioclase.
Olivine	?	0.2	?		?	
SECONDARY MINERALOGY						
Clay minerals	0.6			REPLACING/FILLING		COMMENTS
				Olivine.		Brownish smectite or mixed-layer smectite chlorite.
Chlorite	1.4			Plagioclase.		Interstitial.
Actinolite	7.6			Clinopyroxene.		
Talc	5.2			Olivine.		Associated with magnetite, and as interstitial phase.
Pyrite	Tr			Olivine.		Interstitial phase (10-150 microns).
Chalcopyrite	Tr			Olivine.		Interstitial, replacing silicate minerals with pyrite (2-40 microns).
Magnetite	Tr			Olivine.		Associated with talc (1-5 microns).
VESICLES/CAVITIES						
Vein	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
	?	?	0.3	Actinolite.	?	Actinolite vein with 1 mm alteration halo where rock is more extensively altered (40%).

COMMENTS: Alteration halo is omitted from point count. Crystal clots of olivine+plagioclase, plagioclase+clinopyroxene+magnetite, and clinopyroxene+plagioclase are commonly well compacted. Spinel-bearing proto-troctolitic crystal clots indicate relatively primitive compositions. Spinel is sometimes included in isolated plagioclase megacrysts.

140-504B-200R-01 (Piece 21,128-131 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	4.8	0.49-1.54		Equant, elongate.	Partially altered to talc, serpentine, and magnetite (5%-40%).
Plagioclase	6.6	6.6	0.73-2.20		Subhedral thick plates.	Weakly zoned.
Clinopyroxene	1.8	1.8	1.16-3.25		Subhedral, anhedral.	Ophitic.
Spinel	Tr	?	0.02-0.2		Euhedral.	
GROUNDMASS						
Plagioclase	43.8	40.6	0.61-1.15		Laths.	Spays of plagioclase in augite.
Clinopyroxene	31.4	43.0	0.29-0.93		Anhedral.	Ophitic to poikilitic.
Olivine	?	1.0	0.17-0.32		Equant, subhedral.	
Pyrite	Tr	?	0.02-0.1		Anhedral.	Inclusions in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine	Tr	Olivine.				Associated with talc, magnetite+/-pyrite.
Chlorite	2.0	?				Interstitial, associated with actinolite.
Actinolite	?	Clinopyroxene.				Interstitial, associated with chlorite, bright-green amphibole.
Talc/smectite	7.8	Olivine.				
Pyrite	Tr	Silicate minerals, olivine.				Interstitial (5-250 microns).
Chalcopyrite	Tr	Silicate minerals.				Intergrown with pyrite.
Hematite	Tr	Olivine.				In serpentine replacing olivine.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	3	Throughout?		Chlorite, actinolite.	Irregular.	None.

COMMENTS: Some plagioclase-dominated proto-clots occur with trapped melt pockets (crystallized to clinopyroxene+plagioclase+/-magnetite). Rare, elongated clinopyroxene oikocrysts include elongate plagioclase grains and isometric magnetite. Plagioclase is similar to other thin sections from this unit. Altered olivine grains still contain fresh spinel. Large olivine phenocrysts have large altered glass inclusions (0.1x0.4 mm). Spinel forms equant (60-micron) grains in plagioclase and is only found in finer-grained phenocrysts. Olivine in the groundmass is completely altered.

SITE 504

140-504B-200R-02 (Piece 4, 26-31 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Moderately olivine-plagioclase phyric diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.2	4.8	0.81-1.80		Equant, subhedral.	Fresh olivine partially altered to talc, smectite, serpentine, and magnetite. Phenocrysts are 5%-60% altered.
Plagioclase	3.4	3.4	0.55-2.11		Subhedral thick plates.	Groundmass crystals are completely altered. Chrome spinel included in plagioclase.
GROUNDMASS						
Plagioclase	47.0	48.4	0.32-1.74		Skeletal, euhedral.	Branching clusters in clinopyroxene.
Clinopyroxene	32.0	41.2	0.32-1.28		Anhedral.	Ophitic to poikilitic.
Olivine	?	0.4	0.15-0.26		Subhedral.	
Opaque minerals	5.0	1.8	0.07-0.16		Subhedral, euhedral.	Partially altered to titanite, skeletal.
Chrome spinel	Tr	Tr	0.02-0.12		Subhedral.	Interstitial.
SECONDARY MINERALOGY						
	REPLACING/PERCENT	FILLING				COMMENTS
Serpentine	Tr	Olivine.				Associated with talc, magnetite, +/- pyrite.
Chlorite	2.8	?				Interstitial, associated with actinolite.
Actinolite	3.0	Clinopyroxene.				Interstitial, brownish and bright green, associated with chlorite.
Talc	0.4	Olivine.				
Talc/smectite	4.8	Olivine.				Associated with serpentine, magnetite, pyrite, and as interstitial phase.
Pyrite+ chalcopyrite	Tr	Olivine.				Associated with actinolite after clinopyroxene, and after silicate minerals.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	3	Throughout.	?	Brown and green amphibole.	Irregular.	None.

COMMENTS: Proto-troctolitic clots with cumulus olivine and a plagioclase, clinopyroxene, magnetite intercumulus assemblage. Some plagioclase-rich clusters with spinel inclusions. Plagioclase phenocrysts are zoned, and unzoned, and form glomeroporphyritic clusters with a cumulate texture. Phenocrysts have 50- to 100-micron, normally zone rims and chrome spinel inclusions. Complexly zoned plagioclase phenocrysts are also present. Groundmass grains are mostly unzoned but may include 20-micron euhedral, red-brown inclusions. Olivine contains altered, round glass inclusions. Spinel grains (20-50 microns) are equant, dark reddish-brown to dark yellowish-brown. Grains of both color occur within a single plagioclase phenocryst. Yellow-brown spinel occurs in groundmass plagioclase. Chalcopyrite and pyrite occur as inclusions in plagioclase. Pyrite inclusions in olivine.

140-504B-200R-02 (Piece 6,44-46 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227

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

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.4	5.2	0.17-1.80		Equant, elongate.	Partially altered to serpentine, magnetite, talc, and pyrite.
Plagioclase	3.4	4.2	0.67-2.11		Subhedral thick plates.	
Clinopyroxene	0.6	2.8	1.16-2.03		Subhedral, anhedral.	Ophitic, exsolution.
Spinel	Tr	Tr	0.06-0.2		Euhedral.	Chrome spinel included in plagioclase, and interstitial.
GROUNDMASS						
Plagioclase	49.2	49.8	0.61-0.90		Laths.	Branching crystals in augite.
Clinopyroxene	35.0	36.4	0.29-1.45		Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.6	1.6	0.06-0.24		Anhedral, skeletal, euhedral.	Magnetite is partially altered to titanite.
Pyrite, chalcopyrite	Tr	Tr	?			Inclusions in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Serpentine	1.0	Olivine.				
Chlorite	0.6	?				Interstitial.
Actinolite	4.8	Clinopyroxene.				Interstitial with chlorite.
Talc	3.4	Olivine.				Associated with serpentine, magnetite, interstitial to silicate minerals.
Pyrite	Tr	Olivine.				Associated with magnetite, interstitial areas.
Chalcopyrite	Tr	Olivine, silicate minerals.				Associated with pyrite, magnetite, interstitial areas.
Hematite	Tr	Olivine.				Associated with serpentine.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	3	Throughout.	?	Actinolite, chlorite.	Irregular.	None.

SITE 504

140-504B-200R-03 (Piece 2C, 13-16 cm)

OBSERVER: SBP WHERE SAMPLED: Unit 227.

ROCK NAME: Highly olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	4.0	0.20-2.84		Equant to subhedral.	Partly altered to talc, serpentine.
Plagioclase	2.8	3.4	0.84-1.86		Subhedral thick plates.	Weakly zoned.
Clinopyroxene	1.0	3.2	1.16-3.19	Augite.	Subhedral prisms.	Inclusion-free cores with ophitic to poikilitic rims.
Spinel	Tr	Tr	0.05-0.10		Euhedral.	Chrome spinel in groundmass and as inclusions in olivine, plagioclase, augite. One spinel contains a melt inclusion.
GROUNDMASS						
Plagioclase	52.6	52.1	0.64-1.19		Laths.	Branching splays in augite.
Clinopyroxene	30.6	35.6	0.49-1.31	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.4	1.7	0.09-0.23		Equant to skeletal.	
Pyrite	Tr	Tr	0.01		Anhedral.	In plagioclase.
Chalcopyrite	Tr	Tr	0.01		Anhedral.	In plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.4	Interstitial.				
Actinolite	6.4	Clinopyroxene, interstitial.				
Talc	3.6	Olivine, interstitial.				Associated with actinolite.
Serpentine	0.6	Olivine.				Minor in talc altered olivine.
Pyrite	Tr	Olivine, interstitial.				Associated with chalcopyrite in silicate minerals.
Chalcopyrite	Tr	Interstitial.				10-30 microns.
Magnetite	Tr	Olivine.				Associated with talc.
Hematite	Tr	Olivine.				Associated with serpentine and talc.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Clinopyroxene oikocrysts enclose skeletal plagioclase laths. Plagioclase-rich mineral clusters contain trapped melt pockets. Crystallized to augite-magnetite-and minor plagioclase. Proto-gabbroic clots are well compacted and appear to have partly re-equilibrated with the groundmass.

140-504B-200R-03 (Piece 8B, 59-63 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly olivine-clinopyroxene-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic to poikilitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	5.2	0.29-2.26		Equant, euhedral.	Only partly altered.
Plagioclase	2.4	2.4	1.07-3.71		Subhedral.	Zoned.
Clinopyroxene	2.8	2.8	1.74-2.18	Augite	Anhedral to subhedral.	Ophitic.
Spinel	Tr	Tr	?		Euhedral.	Chrome spinel in groundmass and as inclusions in olivine, plagioclase, and augite.
GROUNDMASS						
Plagioclase	47.2	46.4	0.64-1.05		Laths, subhedral.	Weakly developed skeletal morphology.
Clinopyroxene	27.6	40.4	0.64-1.77	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	4.6	2.8	0.41-0.67		Equant to skeletal.	Magnetite partly replaced by titanite.
Pyrite	Tr	Tr	?		Anhedral.	Included in plagioclase.
Chalcopyrite	Tr	Tr	?		Anhedral.	Included in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Talc	5.6	Olivine, silicate minerals.				Associated with magnetite and pyrite.
Chlorite	3.6	Interstitial areas.				
Actinolite	5.4	Pyroxene, interstitial areas.				
Serpentine(?)	0.6	Olivine.				Minor, in center of talc-altered olivine.
Pyrite+ chalcopyrite	Tr	Olivine, silicate minerals.				Associated with talc, mixed-layer clays and actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Well-compacted and moderately compacted proto-gabbroic clots. Irregular arrays of melt inclusions in plagioclase suggest partial remelting.

SITE 504

140-504B-200R-03 (Piece 17A, 106-108 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic to poikilitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	7.4	0.35-2.67		Equant, subhedral.	Completely altered.
Plagioclase	11.4	11.4	0.84-2.52		Subhedral thick plates.	Grains contain melt inclusions and complex zoning.
Clinopyroxene	7.6	7.6	1.22-5.51	Augite.	Anhedral prisms.	Ophitic with some sector-zoning.
GROUNDMASS						
Plagioclase	28.6	40.6	0.49-0.99		Laths.	Some branching sprays in augite host.
Clinopyroxene	18.8	31.8	0.44-0.73	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.8	1.2	0.10-0.17		Equant, skeletal.	Ilmenite exsolution, partially altered to titanite.
Spinel	Tr	Tr	0.05		Euhedral.	As inclusions in all phenocryst phases, red-brown to yellow-brown.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clay minerals	1.4	Olivine.				Olivine cores, golden-brown smectite.
Chlorite	4.0	Plagioclase.				Interstitial, vugs, veins.
Albite	1.6	Plagioclase.				
Actinolite	18.0	Clinopyroxene.				Interstitial, vugs, veins.
Talc	6.8	Olivine.				Rims olivine and completely replaces olivine, associated with magnetite and pyrite.
Magnetite	Tr	Olivine.				With talc.
Pyrite+chalcopyrite	Tr	Olivine, silicate minerals.				Pyrite as inclusions in plagioclase (2-150 microns), chalcopyrite (2-10 microns).
Hematite	Tr	Olivine.				With serpentinite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	5	Middle of section.	1-3 mm.	Actinolite, chlorite.	Irregular.	None.

COMMENTS: Slightly altered (15%) except around amygdules where rock is extensively altered (>50%) and olivine which is completely replaced by talc (100%). Contains 0.11-mm actinolite and chlorite veins. Clots are comprised of olivine-dominated, olivine+plagioclase, olivine+plagioclase+clinopyroxene, and plagioclase+clinopyroxene-rich aggregates. Proto-troctolitic clots (olivine+plagioclase) have cumulate textures and contain trapped liquid pockets crystallized to magnetite+plagioclase+clinopyroxene.

140-504B-200R-03 (Piece 20,125-130 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.2	4.4	1.31-3.05		Subhedral to anhedral.	Partly altered to talc and serpentine. Poikilitic to ophitic, some crudely skeletal.
Plagioclase	4.6	4.6	1.16-2.58		Subhedral.	As phenocrysts, xenocrysts, in xenoliths.
Clinopyroxene	2.8	3.2	2.03-5.60		Subhedral to anhedral.	Ophitic to poikilitic some with inclusion-free zoned cores.
GROUNDMASS						
Plagioclase	46.8	46.2	0.46-2.55		Thick laths.	Acicular, skeletal, and branching crystals.
Clinopyroxene	25.2	39.0	0.52-1.16	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.2	2.6	0.09-0.32		Equant to skeletal.	Magnetite partly altered to titanite.
Olivine	0	?	0.15-0.30		Anhedral.	Completely altered.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.4	Olivine.				Serpentine.
Clays	0.6	Olivine.				Talc-smectite.
Chlorite	0.6	Interstitial.				
Actinolite	7.6	Clinopyroxene, interstitial.				
Talc	9.0	Olivine.				Associated with magnetite.
Magnetite	Tr	Olivine.				Associated with talc.
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Inclusions in plagioclase.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	Network.	40-4000	Chlorite, actinolite.		None.

COMMENTS: Spinel occurs in an augite oikocryst, in the core of an unzoned plagioclase, in plagioclase glomerocrysts, in plagioclase-augite clots, and in altered olivine. In the plagioclase glomerocryst both a 100-micron red-brown and a 40-micron yellow-brown spinel occur. Where spinels are in contact with the groundmass they are dark to opaque and have a symplectic texture indicating reactions with the late trapped liquid. Magnetite or opaque iron-rich spinel appears to have grown on the rims of some chrome spinel. Some coarse "actinolite" prisms are moderately colored, transitional to hornblende.

SITE 504

140-504B-200R-04 (Piece 6,23-27 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 227.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.2	5.2	0.26-2.18		Equant to euhedral.	30% to 100% altered.
Plagioclase	6.0	6.0	1.15-1.59		Subhedral.	Weakly zoned.
Clinopyroxene	1.6	1.6	1.11-1.37	Augite.	Anhedral to subhedral.	Ophitic.
Spinel	Tr	Tr	0.05-0.1		Subhedral, euhedral.	Chrome spinel inclusion in plagioclase and in groundmass.
GROUNDMASS						
Plagioclase	41.4	44.4	0.56-0.89		Laths.	
Clinopyroxene	25.8	40.2	0.37-0.89	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.8	2.6	0.09-0.39		Equant to skeletal.	Ilmenite exsolution lamellae, partly altered to titanite.
Pyrite	?	Tr	?		Anhedral.	Included in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2.0	Olivine cores.				Talc-smectite.
Chlorite	4.4	Interstitial, plagioclase.				
Albite	0.8	Plagioclase.				
Actinolite	8.2	Clinopyroxene, interstitial, olivine.				
Serpentine+ hematite	0.2	Olivine.				
Talc+magnetite	5.6	Olivine.				
Pyrite	Tr	Olivine, silicate minerals, titanomagnetite.				Interstitial with chalcopyrite. 10-20 microns.
Chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase. Associated with pyrite and magnetite. 10-20 microns.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdale	0.5	Corner.	1.0	Actinolite, chlorite.	Irregular.	None.

COMMENTS: Well-compacted to poorly compacted crystal clots of protogabbro to anorthositic gabbro. Trapped liquid pockets crystallized to clinopyroxene, magnetite (up to 50%), and rarely plagioclase.

140-504B-201R-01 (Piece 5, 19-23 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 228.

ROCK NAME: Moderately clinopyroxene-olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	1.25-1.74		Equant, euhedral.	Completely altered.
Plagioclase	0.8	0.8	0.73-2.00		Euhedral to subhedral.	Weakly zoned.
Clinopyroxene	1.4	1.8	0.73-3.57	Augite.	Anhedral prisms.	Ophitic with inclusion-free cores, weakly zoned.
GROUNDMASS						
Plagioclase	46.4	54.6	0.41-1.51		Laths to thick plates.	Some with acicular to skeletal morphologies.
Clinopyroxene	25.8	38.4	0.26-0.52	Augite.	Anhedral.	Ophitic.
Granophyre	1.4	?	?		?	Quartz+feldspar intergrowths.
Opaque minerals	5.2	3.4	0.11-0.24		Equant to skeletal.	Ilmenite exsolution, partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.6	Olivine, interstitial, plagioclase.				
Albite	0.8	Plagioclase.				
Actinolite	17.6	Clinopyroxene, interstitial, olivine.				
Magnetite	Tr	Olivine.				1-5 microns, with pyrite, chlorite.
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Inclusions in plagioclase, 5-100 microns.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Clinopyroxene oikocrysts with plagioclase chadocrysts and sometimes with magnetite and olivine chadocrysts. Single 100-micron-wide chlorite and actinolite vein, locally splits into smaller veinlets.

SITE 504

140-504B-202R-01 (Piece 7, 25-29 cm)

OBSERVER: SBP WHERE SAMPLED: Unit 229.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	0.26-1.45		Equant, euhedral.	Completely altered.
Plagioclase	3.8	3.8	0.83-3.10		Euhedral, subhedral.	As complexly zoned phenocrysts, concentrically zoned grains and clots. Inclusions in plagioclase with plagioclase or glass inclusion. Symplectic rim with groundmass.
Spinel	Tr	Tr	?		?	
GROUNDMASS						
Plagioclase	48.4	50.4	0.73-1.16		Laths.	Splays of branching crystals in augite.
Clinopyroxene	35.0	41.0	0.32-1.16	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.4	2.8	0.12-0.42		Equant, skeletal.	Magnetite is partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay Minerals	Tr	Olivine.				Smectite-rich mixed-layer clay.
Chlorite	0.8	Plagioclase.				Interstitial.
Actinolite	9.2	Clinopyroxene, plagioclase.				Interstitial.
Talc	1.2	Olivine.				Associated with magnetite, quartz, pyrite, and chalcopyrite.
Serpentine	0.2	Olivine.				
Hematite	Tr	Olivine.				
Pyrite+ chalcopyrite	Tr	Olivine.				Interstitial, inclusions in plagioclase, replacing silicate minerals (2-150 microns).
Magnetite	Tr	Olivine, pyroxene.				<1-5 microns.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

140-504B-202R-01 (Piece 11, 41-45 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 230.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic to poikilitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	2.2	0.29-1.83		Equant, euhedral.	Completely altered, original with plagioclase inclusions.
Plagioclase	3.8	5.0	1.02-3.05		Euhedral to subhedral.	Glass inclusions and multiple oscillatory zones near rim.
Spinel	Tr	Tr	?		Euhedral.	In plagioclase phenocrysts and glomerocrysts, reddish-brown to yellow-brown.
GROUNDMASS						
Plagioclase	43.0	48.4	0.67-1.54		Laths.	Splays of branching crystals in augite.
Clinopyroxene	35.2	42.0	0.55-1.45	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.0	2.4	0.13-0.44		Equant to skeletal.	Ilmenite exsolution, partly altered to titanite (80%).
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.2	Olivine, interstitial.				Mixed-layer chlorite-smectite.
Chlorite	5.6	Olivine, plagioclase, interstitial.				Associated with magnetite where replacing olivine rims.
Albite	2.0	Plagioclase.				
Actinolite	7.2	Clinopyroxene, interstitial.				
Titanite	Tr	Olivine, titanomagnetite.				
Pyrite+ chalcopyrite	Tr	Olivine, interstitial, silicate minerals.				Pyrite 10-200 microns. Chalcopyrite 1-20 microns.
Magnetite	Tr	Olivine rim.				Associated with chlorite.
Serpentine	Tr	Olivine core.				Often associated with titanite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: Plagioclase oikocrysts include elongated plagioclase laths and rare euhedral to subhedral augite grains. Plagioclase-dominated mineral clusters are usually well compacted and contain some primary-textured opaque mineral.

140-504B-203R-01 (Piece 2, 4-7 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 231.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic, microcrystalline to cryptocrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.2	0.2	0.19-0.60		Subhedral, euhedral.	Zoned.
GROUNDMASS						
Plagioclase	39.4	40.6	0.10-0.45		Laths.	Acicular to weakly skeletal.
Clinopyroxene	47.6	46.5	0.04-0.11		Granular, fibrous.	
Quench crystals	8.4	10.6	?		Fibrous.	
Opaque minerals	2.4	2.2	0.05-0.26		Equant, skeletal.	Slightly altered to titanite with ilmenite exsolution.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.4	?				Interstitial.
Actinolite	1.6	Clinopyroxene.				Interstitial.
Pyrite	Tr	Silicate minerals.				Interstitial, inclusions in plagioclase (2-50 microns).
Chalcopyrite	Tr	Silicate minerals.				Interstitial, inclusions in plagioclase (2-50 microns).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	10 microns.	Chlorite.	?	Discontinuous chlorite vein.
Vein	?	?	70 microns.	Actinolite.	?	The chlorite and actinolite veins do not intersect.

SITE 504

140-504B-203R-01 (Piece 10, 33-36 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.2	0.40-0.81		Equant, euhedral.	Completely altered.
Plagioclase	Tr	0.8	2.73		Thick blades.	Partially altered to albite.
Spinel	Tr	Tr	0.2		Subhedral, equant.	Almost black grain, 20 microns from rim of unzoned plagioclase.
GROUNDMASS						
Plagioclase	31.6	52.0	0.38-2.50		Thick laths, blades.	Elongate subhedral.
Clinopyroxene	0.4	44.4	0.9-1.6	Augite.	Anhedral.	Partially altered to actinolite.
Opaque minerals	1.8	2.6	0.15-0.38		Equant, subhedral.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.6	Clinopyroxene.				
Albite	10.0	Plagioclase.				
Actinolite	54.6	Clinopyroxene.				
Titanite	Tr	Titanomagnetite.				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.05-0.6 m	Actinolite.	?	?

COMMENTS: Original and present point counts contain data for coarser-grained half of thin section, not chilled margin (cryptocrystalline). Texture also refers to the coarser-grained portion. Contact of 2 lithologies 1) aphyric side contains euhedral, unzoned to subhedral, weakly zoned (100-micron) plagioclase laths and equant grains. Fine-grained side contains subhedral, unzoned plagioclase phenocrysts with euhedral plagioclase lath inclusions and slight normal zoning in laths about 1 mm long.

140-504B-203R-01 (Piece 12, 39-42 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Subophitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.4	0.29-1.04		Subhedral.	Completely altered.
Spinel	Tr	Tr	0.17-0.52		Equant, euhedral.	Included in plagioclase.
GROUNDMASS						
Plagioclase	35.6	51.0	1.07-2.18		Thick laths.	
Clinopyroxene	20.8	46.4	1.02-1.83		Anhedral.	Subophitic to ophitic.
Opaque minerals	1.4	2.2	0.26-0.49		Equant, skeletal.	Ilmenite exsolution lamellae, partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.0	Olivine and plagioclase.				Interstitial.
Albite	6.4	Plagioclase.				
Actinolite	34.8	Clinopyroxene, olivine, plagioclase.				Interstitial, veins.
Pyrite	Tr	Silicate minerals.				Only 6 grains (10-100 microns).
Magnetite	Tr	Clinopyroxene.				Associated with actinolite (<1-5 microns).

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	?	0.05-0.5	Actinolite.	?	Numerous small veins with no clear sequence of formation.

COMMENTS: Veins included in point count. Unusually low sulfide mineral abundance.

140-504B-203R-01 (Piece 15, 57-59 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Subophitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.2	0.41-0.87		Euhedral, subhedral.	Completely altered.
Plagioclase	0.8	0.4	1.0-2.93		Subhedral, anhedral.	Weakly zoned.
Spinel	Tr	Tr	0.2		Anhedral.	Large chrome spinel in actinolite matrix.
GROUNDMASS						
Plagioclase	32.0	56.0	0.87-2.38		Thick laths.	Some splays of branching crystals in augite.
Clinopyroxene	17.4	41.4	0.73-1.77	Augite.	Anhedral.	Subophitic, ophitic, and poikilitic.
Opaque minerals	2.8	2.0	0.04-0.11		Equant, skeletal.	Extensively altered to titanite, ilmenite exsolution.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.6	Olivine, plagioclase.				Interstitial.
Albite	13.4	Plagioclase.				
Actinolite	33.0	Clinopyroxene.				Interstitial, veins.
Titanite	Tr	?				Interstitial, associated with chlorite and actinolite.
Pyrite	Tr	Silicate minerals.				Interstitial (1-100 microns).
Chalcopyrite	Tr	?				Interstitial, in altered clinopyroxene (1-2 microns).
Magnetite	Tr	Clinopyroxene.				Associated with actinolite (4-10 microns).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	4	Actinolite.	?	Fibrous actinolite vein with diffuse boundaries rimmed by a 4-mm actinolite-rich alteration halo.

COMMENTS: Very rare sulfide minerals.

140-504B-204R-01 (Piece 3, 12-14 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Sparsely olivine-plagioclase aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.55-1.85		Equant, euhedral.	Altered to actinolite.
Plagioclase	0	0.1	1.16-1.42		Stubby plates.	Partially altered to albite and chlorite.
Spinel	Tr	Tr	?		?	Deep-red (200-micron) round phenocryst with 40-micron opaque rim.
GROUNDMASS						
Plagioclase	27.2	54.4	0.95-2.26		Thick laths.	Some grains occur as branching splays in augite.
Clinopyroxene	3.2	42.7	0.52-1.62	Augite.	Anhedral.	Extensively altered, primary mode is not precise, ophitic.
Opaque minerals	2.0	1.5	0.15-0.38		Equant, skeletal.	Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.8	?				Interstitial, veins.
Albite	11.6	Plagioclase.				
Actinolite	55.2	Clinopyroxene, olivine, veins.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.2-0.8	Actinolite, chlorite.	Network.	Actinolite vein in network are cut by 50-micron chlorite veins. Actinolite+chlorite veins postdate actinolite veins.

COMMENTS: Spinel occurs in plagioclase phenocrysts and plagioclase-augite intergrowths.

SITE 504

140-504B-204R-01 (Piece 7, 28-32 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.4	0.6	3.0		Subhedral, anhedral.	Weak zoning.
GROUNDMASS						
Plagioclase	40.6	48.8	1.04-2.76	Augite.	Euhedral, subhedral.	Splays of branching crystals in augite.
Clinopyroxene	19.4	48.8	0.9-2.76		Subhedral, anhedral.	Ophitic to poikilitic.
Opaque minerals	2.2	1.8	0.15-0.39		Subhedral, skeletal.	Magnetite exsolution lamellae, altered 70% to titanite.
Spinel	Tr	Tr	?		?	Dark yellow-brown inclusion in plagioclase.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.4	Plagioclase.				Interstitial.
Albite	10.6	Plagioclase.				
Actinolite	25.4	Clinopyroxene, olivine(?).				Interstitial.
Pyrite	Tr	Silicate minerals.				Interstitial with chalcopyrite (10-150 microns).
Chalcopyrite	Tr	?				Interstitial, inclusions in plagioclase (5-10 microns).
Pyrrhotite	Tr	?				Inclusion in clinopyroxene with pentlandite(?) and chalcopyrite (12 microns).
Magnetite	Tr	Clinopyroxene.				<1-5 microns.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	10	Throughout.	0.2-1.0	Actinolite,	Irregular. chlorite.	See below.

COMMENTS: Abundant sulfide minerals. Patches of fine-grained actinolite and chlorite may be amygdules or altered interstitial material.

140-504B-205R-01 (Piece 1, 14-17 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 232.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.8	0.8	1.2-1.6		Subhedral, anhedral.	Weak zoning.
GROUNDMASS						
Plagioclase	22.2	53.4	1.02-3.83	Augite.	Subhedral, euhedral.	
Clinopyroxene	3.0	42.2	0.61-2.03		Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.2	3.6	0.2-.46		Equant, skeletal.	Ilmenite exsolution, extensively altered titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.6	Plagioclase.				Interstitial.
Albite	24.0	Plagioclase.				
Actinolite	47.2	Clinopyroxene, plagioclase.				Interstitial, veins.
Magnetite	Tr	Clinopyroxene.				Associated with actinolite.
Pyrite	Tr	Silicate minerals.				Included in plagioclase, locally abundant near actinolite veins.

VESICLES CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.2-0.6	Actinolite.	?	Fibrous to prismatic actinolite, trace albite (or quartz) and chlorite at center of some veins.

COMMENTS: Veins included in point count. Plagioclase-dominated mineral clusters contain very small blebs of secondary magnetite. Most "actinolite" in groundmass and veins is fine-grained, "dirty", but about 1/3 is replaced or recrystallized into pleochroic (yellow-green to blue-green) pale amphibole in well-crystallized prisms or massive aggregates.

140-504B-205R-01 (Piece 9, 36-38 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 238.

ROCK NAME: Moderately plagioclase-clinopyroxene-olivine phyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.3	0.6	0.46-0.90		Equant, euhedral.	20% to 100% altered (average 50%).
Plagioclase	3.0	3.0	0.75-2.09		Euhedral, subhedral.	Fresh.
Clinopyroxene	1.0	1.0	1.25-2.41		Euhedral, subhedral.	Fresh, some crystals partially resorbed, stubby plagioclase inclusions.
Spinel	Tr	Tr	?		?	
GROUNDMASS						
Plagioclase	15.6	15.6	0.05-0.40		Laths.	
Clinopyroxene	9.4	9.4	0.04-0.15		Granular.	
Opaque minerals	5.2	5.2	0.04-0.07		Equant, skeletal.	
Cryptocrystalline	65.5	65.2	?		?	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Talc	Tr	Olivine.				Rims olivine, associated with magnetite.
Chlorite	Tr	Plagioclase.				Part of a 20-micron vein with actinolite, cuts groundmass and plagioclase phenocryst.
Actinolite	Tr	?				
Serpentine	Tr	Olivine.				Core or rim.
Magnetite	Tr	Olivine.				Rim.
Pyrite	Tr	Olivine, silicate minerals.				Interstitial and in olivine core (10-200 microns).
Chalcopyrite	Tr	?				Interstitial.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	20	Chlorite, actinolite.	?	?

COMMENTS: Plagioclase glomerocrysts are composed of unzoned subhedral to euhedral grains and anhedral crystal fragments as well as grains with wavy extinction and normally zoned grains with oscillatory zoned cores. One core contains altered glass inclusions. Phenocrysts are 1) subhedral oscillatory zoned grains with fine oscillations superimposed on 100-micron broad oscillations, 2) euhedral grain with 50-micron rim and a spinel included 50 microns from the rim, 3) grains with wavy extinction included in augite and as isolated phenocrysts.

SITE 504

140-504B-205R-01 (Piece 14, 64-67 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 233.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.2	0.58-1.16		Equant, euhedral.	Altered to talc, smectite, serpentine.
Plagioclase	3.8	3.8	0.78-1.48		Subhedral.	Weakly zoned to oscillatory zoned: some with glass inclusions.
Clinopyroxene	2.0	2.0	1.04-2.03	Augite.	Anhedral to euhedral.	Prismatic crystals with inclusion-free cores and ophitic rims.
Spinel	Tr	Tr	?		Subhedral.	Associated with magnetite at olivine-groundmass boundary.
GROUNDMASS						
Opaque	3.0	3.0	0.07-0.21		Equant to skeletal.	Magnetite altered to titanite (30%).
Plagioclase	46.6	46.8	0.81-1.51		Laths.	Acicular with aspect ratios up to 1:2.
Clinopyroxene	32.4	42.2	0.20-0.87	Augite.	Anhedral.	Ophitic to subophitic.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clays	0.2	Olivine.				Smectite.
Talc	3.0	Olivine.				Associated with magnetite and mixed-layer clays.
Chlorite	0.4	Interstitial.				Vein with actinolite.
Albite	0.4	Plagioclase.				
Actinolite	8.0	Clinopyroxene, interstitial, veins.				
Talc-smectite	0.2	Olivine.				
Pyrite+ chalcopyrite	Tr	Olivine, silicate minerals.				Included in plagioclase (10-100 microns), interstitial.
Magnetite+ hematite	Tr	Olivine.				Associated with talc-smectite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: 50-micron actinolite-chlorite vein. Proto-gabbroic clots and plagioclase-dominated clots contain clinopyroxene-magnetite segregations that represent pockets of trapped liquid. Olivine-bearing proto-gabbroic clots are generally well compacted, but contain magnetite and/or clinopyroxene along grain boundaries that may represent trapped liquid.

140-504B-205R-01 (Piece 21, 87-90 cm) OBSERVER: SBP WHERE SAMPLED: Unit 235.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.0	0.15-2.9		Equant, euhedral.	Zoned alteration to talc and smectite.
Plagioclase	5.2	5.2	1.02-1.60		Subhedral.	Variety of zoning types.
Clinopyroxene	1.4	1.4	1.25-1.83	Augite.	Anhedral to subhedral.	Ophitic rims with inclusion-poor cores.
Spinel	Tr	Tr	0.03-0.10		Equant.	Within glass inclusion in olivine, in phenocrysts, and in altered groundmass.
GROUNDMASS						
Plagioclase	46.4	45.0	0.46-1.10		Laths.	Sprays of branching plagioclase in augite.
Clinopyroxene	35.6	42.6	0.17-0.23	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	3.2	2.8	0.06-0.15		Equant to skeletal.	Ilmenite exsolution, slightly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	1.0	Olivine.				Smectite(olive-brown).
Serpentine	Tr	Olivine.				Associated with oxidized magnetite.
Chlorite	0.4	Interstitial.				
Actinolite	3.0	Clinopyroxene, interstitial.				
Talc	3.8	Olivine.				Inclusions in plagioclase.
Pyrite	Tr	Silicate, especially olivine.				Interstitial, 10-200 micron.
Chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase and pyrite, 2-10 microns.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: Serpentine lizardite replaces olivine (2 grains) and partly recrystallized to interpenetrating antigorite; most olivine has been replaced by talc and smectite. Plagioclase occurs in 5 types in various combinations: (1) with zones of glass inclusions; (2) with oscillatory zoned rims; (3) with multiple oscillations throughout; (4) in clots of plagioclase only; (5) in plagioclase-augite clots. Spinel forms (1) dark reddish-brown grains greater than 100 microns, with inclusions of plagioclase and glass, or pyroxene and black rims attached to 2-mm olivine grains (altered); (2) 60-micron spinel with pyrite at edge of plagioclase, in incident light rim of spinel is more reflective than core; (3) dark red-brown to black subhedral spinel in plagioclase.

SITE 504

140-504B-206R-01 (Piece 11, 47-50 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 235.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.0	0.15-2.67		Equant, euhedral.	Altered to chlorite, talc-smectite, and mixed-layer clay.
Plagioclase	7.6	7.6	1.02-2.32	Augite.	Subhedral.	Variety of zoning patterns.
Clinopyroxene	4.8	4.8	1.33-3.63		Anhedral to euhedral.	Prismatic with scattered euhedral plagioclase inclusions and olivine.
Spinel	Tr	Tr	0.04-0.10		Subhedral.	Reddish-brown inclusions in plagioclase phenocrysts. Dark inclusions in groundmass plagioclase.
GROUNDMASS						
Plagioclase	39.4	39.4	0.52-0.84		Laths.	Acicular, skeletal, and branching crystals.
Clinopyroxene	27.0	44.2	0.23-0.58	Augite.	Anhedral.	Subophitic to poikilitic.
Opaque minerals	1.4	1.0	0.06-0.15		Equant, skeletal.	Partly altered to titanite in groundmass and as inclusions in plagioclase and augite phenocrysts.
Quench crystals	0.6	?	?	?		
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clays	0.4	Olivine.				Smectite (olive-brown).
Clays	0.4	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	3.6	Olivine, interstitial.				
Actinolite	13.2	Clinopyroxene, interstitial.				
Talc	1.4	Olivine.				
Pyrite	Tr	Olivine, interstitial, groundmass.				Chalcopyrite also as inclusions in titanomagnetite and plagioclase (2-30 microns).
Hematite	Tr	Olivine, smectite, chlorite, quartz.				
Magnetite	Tr	Olivine.				Associated with talc and pyrite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0.5	Random.	0.2-0.8	Actinolite, chlorite.	Irregular.	Amygdules.

COMMENTS: Plagioclase-dominated clots contain spinel inclusions. Some augite phenocrysts have pockets of groundmass and secondary melt inclusions, suggesting remelting or reaction with groundmass. Olivine alteration is variable: chlorite occurs in fine-grained areas. Vein (0.3 mm) of equant subhedral diopside and minor plagioclase with a halo of recrystallized augite. Plagioclase forms (1) complex phenocrysts: polyhedral unzoned core with 10- to 70-micron glass inclusions, mantled with fine oscillations, and a uniform rim; (2) plagioclase glomerocrysts have grains with zoning described in (1) and also oval unzoned grains.

140-504B-207R-01 (Piece 1,0-4 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 236.

ROCK NAME: Aphyric diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPO- SITION	MORPHOLOGY	COMMENTS
Plagioclase	51.0	53.0	0.7-1.97		Thick laths, skeletal.	
Clinopyroxene	24.0	42.4	0.32-1.10	Augite.	Anhedral.	Ophitic to subophitic.
Interstitial	1.0	0.6	?		Granophyre.	Quartz and feldspar.
Opaque minerals	3.4	4.0	0.15-0.49		Equant, skeletal.	Partially altered to titanite, as inclusions in plagioclase.
SECONDARY MINERALOGY	PERCENT	REPLACING/ FILLING				COMMENTS
Clay Minerals	?	Olivine?				Mixed-layer chlorite suggests presence of olivine, associated with actinolite and pyrite.
Albite	1.6	Plagioclase.				
Actinolite	19.0	Clinopyroxene.				Interstitial and after olivine(?).
Magnetite	Tr	Clinopyroxene.				Associated with actinolite.
Pyrite	Tr	Silicate minerals.				Interstitial, inclusions in plagioclase (5- 100 microns).
Chalcopyrite	Tr	?				Interstitial, intergrown with pyrite (5-20 microns).
VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.2 mm	Actinolite.	?	Fibrous actinolite vein with 5-mm extensively altered halo.

COMMENTS: Abundant pyrite and chalcopyrite. Proto-gabbroic crystal clots (olivine-clinopyroxene-plagioclase), some are enriched in opaque phases.

SITE 504

140-504B-208R-01 (Piece 1, 0-3 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 237.

ROCK NAME: Moderately olivine-plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	4.6	0.2-1.86		Equant, skeletal.	Partially altered to talc, serpentine, and smectite.
Plagioclase	3.0	3.0	1.04-1.54		Subhedral.	Variety of zoning patterns.
Clinopyroxene	2.2	2.2	1.16-3.19	Augite.	Subhedral, anhedral.	Some with scattered plagioclase and olivine inclusions, others are inclusion free.
Spinel	Tr	Tr	0.08-0.10		Anhedral, euhedral.	In groundmass and as inclusions in plagioclase.
GROUNDMASS						
Plagioclase	47.8	47.8	0.35-1.33		Laths.	Abundant sprays of branching crystals in augite.
Clinopyroxene	34.8	40.0	0.29-1.36	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	3.0	1.6	0.07-0.17		Anhedral, skeletal.	Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
Smectite	Tr	REPLACING/FILLING Olivine.				COMMENTS Smectite, talc, serpentine(?), magnetite, and pyrite after olivine.
Chlorite	0.4	Interstitial.				Interstitial.
Actinolite	4.2	Clinopyroxene.				Associated with hematite.
Serpentine	0.4	Olivine.				Associated with magnetite and pyrite, interstitial.
Talc	4.0	Olivine, silicate minerals.				Olivine, interstitial, associated with actinolite.
Pyrite	?	Olivine, silicate minerals.				Inclusions in plagioclase.
Chalcopyrite	?	Silicate minerals.				
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

COMMENTS: Plagioclase-dominated clusters with large augite oikocrysts. Olivine-dominated clusters with interstitial plagioclase. Proto-troctolitic clusters with olivine oikocrysts enclosing plagioclase and primary opaque minerals. Plagioclase intergrowths including small augite grains with some penetrated by pockets of groundmass plagioclase, augite and Fe-Ti oxide minerals. Plagioclase phenocrysts exhibit oscillatory zoning (glass inclusions in core), as glomerocryst with 15 or more grains aligned (cumulate?), and as phenocrysts with plagioclase inclusions and patches of glass inclusions. Olivine phenocryst contains 150-micron altered glass inclusion. Spinel forms dark-brown to black 100-micron euhedral phenocrysts with glass inclusions. Spinel also occurs as irregular dark reddish-brown 90-micron spinel with glass in groundmass plagioclase, as 100-micron equant, subhedral grains in mantle of late-stage 500-micron equant plagioclase with minor zoning and as 80-micron phenocrysts.

140-504B-208R-01 (Piece 7, 30-33 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 237.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic microcrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.6	1.02-3.05		Equant, euhedral.	Completely altered, plucked from thin section(?).
Spinel	Tr	Tr	?		?	
GROUNDMASS						
Plagioclase	25.4	53.6	0.70-1.65		Thick laths.	Altered with slight normal zoning.
Clinopyroxene	0	44.2	0.26-0.81	Augite.	Anhedral.	Subhedral to intersertal, completely altered.
Opaque minerals	2.0	1.6	0.17-0.55		Equant, subhedral.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.2	Interstitial.				
Albite	6.0	Plagioclase.				
Actinolite	66.4	Clinopyroxene, plagioclase.				Interstitial, vugs.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdule	25	Throughout.	1-2	Actinolite.	Irregular smooth walls.	None.

COMMENTS: Amygdules are included in the point count. Chilled margin is not counted. Chilled margin is microcrystalline with microphenocrysts of plagioclase.

140-504B-208R-01 (Piece 9, 36-38 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 238.

ROCK NAME: Moderately plagioclase-clinopyroxene-olivine phyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.6	0.6	0.46-0.9		Equant, euhedral.	20%-100% altered (average 50%).
Plagioclase	3.0	3.0	0.75-2.09		Euhedral-subhedral.	Fresh.
Clinopyroxene	1.0	1.0	1.25-2.41		Euhedral-subhedral.	Fresh, some partly resorbed crystals, stubby plagioclase inclusions.
Spinel	Tr	Tr	?			Reddish-black inclusion in plagioclase.
GROUNDMASS						
Clinopyroxene	9.4	9.4	0.04-0.15		Granular.	
Plagioclase	15.6	15.6	0.05-0.40		Laths.	
Opaque minerals	5.2	5.2	0.04-0.07		Equant-skeletal.	
Cryptocrystalline	65.2	65.2	?		?	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Talc	Tr	Olivine rim.				Associated with magnetite.
Chlorite	Tr					Part of a 20-micron vein with actinolite, cuts groundmass and plagioclase phenocryst.
Actinolite	Tr					
Serpentine	Tr	Olivine.				Replaces olivine core or rim.
Magnetite	Tr	Olivine rim.				
Pyrite	Tr	Olivine core.				Replaces silicate minerals, interstitial, 10- to 200-micron.
Chalcopyrite	Tr	Interstitial.				
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase forms glomerocrysts of unzoned subhedral to euhedral grains and anhedral crystal fragments as well as grains with wavy extinction and normally zoned grains with oscillatory zoned cores. One core contains altered glass inclusions. Phenocrysts are 1) subhedral oscillatory zoned grains with fine oscillations superimposed on 100-micron broad oscillations; 2) euhedral grains with 50-micron rim and a spinel included 50 microns from the rim; 3) grains with wavy extinction included in augite and as isolated phenocrysts.

SITE 504

140-504B-208R-01 (Piece 13, 50-53 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 239.

ROCK NAME: Highly plagioclase-olivine phyric diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.87-1.62		Equant, euhedral.	Altered to talc, serpentine, and smectite.
Plagioclase	9.0	9.0	0.87-2.96		Subhedral.	Variety of zoning patterns.
GROUNDMASS						
Plagioclase	45.8	45.8	0.61-1.91	Augite.	Lath.	Branching splays in augite.
Clinopyroxene	34.2	41.2	0.23-0.75		Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.2	2.2	0.15-0.61		Equant, skeletal.	Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Smectite, serpentine.
Chlorite	1.2	Plagioclase.				Interstitial.
Actinolite	5.4	Clinopyroxene.				Interstitial.
Talc	2.2	Olivine.				Interstitial.
Pyrite	Tr	Silicate minerals.				Interstitial, inclusions in plagioclase (5-100 microns), ± chalcopyrite.
Chalcopyrite	Tr	?				Interstitial, inclusions in plagioclase (5-30 microns).
Magnetite	Tr	Olivine.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Abundant plagioclase-dominated crystal clots. Some contain altered olivine (proto-troctolite) and some contain trapped liquid pockets crystallized to augite and opaque phases. Plagioclase phenocrysts contain complex oscillatory zoning. Some include patches of glass in cores. Phenocryst zoning terminates where the grain contacts olivine or augite. Plagioclase in clots is zoned.

140-504B-208R-01 (Piece 19A, 95-97 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 239.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.1	0.35-1.22		Equant, subhedral.	Completely altered.
Plagioclase	2.1	2.1	0.90-1.48		Subhedral to anhedral.	Weak to oscillatory zoning, some melt inclusions.
GROUNDMASS						
Plagioclase	27.9	51.6	0.44-1.31		Thick laths.	Some acicular, skeletal, and branching crystals.
Clinopyroxene	6.2	42.4	0.41-0.64	Augite.	Anhedral.	Subophitic to ophitic.
Opaque minerals	1.8	1.0	0.10-0.22		Equant to skeletal.	Ilmenite exsolution, partly altered to titanite.
Quartz	0.4	?	?		?	Interstitial quartz and feldspar granophyre.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.4	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	8.4	Interstitial, plagioclase, vein.				
Albite	4.8	Plagioclase.				
Actinolite	48.0	Olivine, clinopyroxene, interstitial.				Vein filling. Replaces olivine with mixed-layer chlorite-smectite.
Quartz	?	Silicate minerals.				In the alteration halo along chlorite/actinolite vein.
Magnetite	Tr	Clinopyroxene.				
Pyrite	Tr	Silicates, interstitial.				Pyrite replaces titanomagnetite.
Chalcopyrite	Tr	?				Chalcopyrite as inclusions in plagioclase (10-40 microns).
Pyrrhotite	Tr	?				Inclusions in pyrite vein (1-6 microns).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0.1	?	1.0	Actinolite, quartz.	Irregular.	Amygdule.

COMMENTS: Actinolite vein (1-4 mm) with 8-mm alteration halo; (1 mm adjacent to vein: 80% alteration, 7 mm away from vein: 60% alteration). Clot of intergrown chalcopyrite and pyrite in core of vein. Chalcopyrite fragments pyrite and occurs in pyrite fractures.

SITE 504

140-504B-208R-02 (Piece 10B, 61-65 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 239.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.0	0.81-1.19		Equant, subhedral.	Altered to talc, chlorite, quartz, clays.
Plagioclase	2.2	2.2	0.90-1.83		Equant, euhedral.	Zoned, commonly with core rich in 5-micron inclusions.
GROUNDMASS						
Plagioclase	47.8	53.0	0.52-1.51		Thick laths.	
Clinopyroxene	29.2	41.4	0.44-0.78	Augite.	Anhedral.	Ophitic.
Opaque minerals	1.4	1.4	0.10-0.26		Equant to skeletal.	Ilmenite exsolution, partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.2	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	2.6	Olivine, interstitial.				Associated with actinolite and titanite.
Albite	0.8	Plagioclase.				
Actinolite	15.2	Clinopyroxene, interstitial.				Associated with chlorite and titanite.
Titanite	Tr	Interstitial.				Associated with chlorite and actinolite.
Quartz	0.2	Olivine.				
Talc	0.4	Olivine, interstitial.				Overprinted by actinolite.
Pyrite+ chalcopyrite	Tr	Interstitial, silicates.				Inclusions in plagioclase. Pyrite 10-200 microns.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: Trace of magnetite replaces olivine and clinopyroxene. Plagioclase-dominated clots occur with some clinopyroxene and opaque minerals. Some include small pockets of trapped liquid crystallized to pyroxene, opaque minerals, and rare plagioclase. Plagioclase: (1) 2-mm phenocryst with uniform core, oscillatory zoned mantle and normal rim, (2) 2x2-mm glomerophyrlic cluster of complexly zoned plagioclase.

140-504B-208R-03 (Piece 1, 7-10 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 239.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	?	0.23-1.91		Euhedral to equant.	Difficult to identify due to alteration.
Plagioclase	2.6	4.2	1.02-3.77		Subhedral thick	Zoned, partially altered. plates.
GROUNDMASS						
Plagioclase	20.6	53.4	0.64-1.31		Thick laths.	Euhedral to subhedral.
Clinopyroxene	0.6	40.7	0.58-0.87	Augite.	Anhedral.	Ophitic to poikilitic, extensively altered.
Opaque minerals	1.4	1.2	0.09-0.29		Equant, skeletal.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	6.0	Plagioclase.				Interstitial.
Albite	8.4	Plagioclase.				
Epidote	Tr	?				50-micron cluster in corner of section.
Actinolite	60.4	Clinopyroxene.				Interstitial, vugs (?).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	15	Center of section.		Actinolite, chlorite.	Irregular.	None.

COMMENTS: Original mode is imprecise due to extensive alteration. Sulfide minerals are not present. Plagioclase phenocrysts include plagioclase, augite, and rare magnetite. Plagioclase forms euhedral laths (0.8-0.2 mm) that are both unzoned and zoned. In olivine-plagioclase clot, individual grains are unzoned. In plagioclase clot, one grain has numerous glass inclusions in a uniform core, followed by a mantle of weak oscillations and a normally zoned rim. A second grain has similar zoning but no glass inclusions.

140-504B-209R-01 (Piece 14B, 98-102 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 240.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.3	0.35-1.45		Equant, euhedral.	
Plagioclase	3.3	3.3	1.74-4.79		Subhedral, anhedral.	Glomerocrysts.
Clinopyroxene	Tr	0.1	2.0-3.5	Augite.	Subhedral.	Ophitic with inclusion-free core.
Spinel	Tr	Tr	0.02-0.05		Anhedral.	Equant reddish-brown inclusion in glomerocrystic plagioclase.
GROUNDMASS						
Plagioclase	17.5	50.7	0.81-1.45		Thick laths.	Subhedral.
Clinopyroxene	1.0	42.0	0.35-1.22	Augite.	Anhedral.	Ophitic.
Opaque minerals	0	1.2	0.12-0.26		Equant, skeletal.	Altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.4	Plagioclase.				Interstitial.
Albite	15.6	Plagioclase.				
Epidote	Tr	Plagioclase.				
Actinolite	57.2	Clinopyroxene, plagioclase.				Interstitial, amygdules.
Titanite	Tr	Titanomagnetite.				
Anhydrite?	Tr	Albite.				In albite replacing plagioclase.
Prehnite	Tr	?				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	15.0	Throughout.	1-4	Actinolite.	Irregular.	Irregular shape with smooth walls.
Vein	?	?	0.4	Actinolite.	?	

COMMENTS: Amygdules included in point count. Proto-gabbroic clots showing regular distribution of augite crystals surrounding central group plagioclase laths (up to 1.5 mm). Anorthositic clots always include some magnetite or plagioclase chadacrysts. Glomerocrysts of plagioclase with uniform cores, 100-micron rims and no oscillations and plagioclase with euhedral cores, oscillatory zoned mantle, and anhedral rim. No sulfide minerals are present.

SITE 504

140-504B-209R-02 (Piece 2, 9-11 cm)

OBSERVER: SBF

WHERE SAMPLED: Unit 239.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.2	0.29-3.39		Equant, euhedral.	Altered to chlorite, quartz, and mixed-layer chlorite-smectite.
Plagioclase	5.2	3.5	0.75-2.58		Subhedral.	Variety of zoning patterns.
Clinopyroxene	0	0.8	0.52-0.96	Augite.	Anhedral.	Rare sector-zoning.
Spinel	Tr	Tr	0.02		Rounded.	Dark reddish-brown inclusions in plagioclasephenocrysts and clots.
GROUNDMASS						
Plagioclase	51.0	50.8	0.70-1.48		Thick-fine laths.	
Clinopyroxene	24.0	41.2	0.44-0.73	Augite.	Anhedral.	Subophitic.
Opaque minerals	2.0	1.5	0.07-0.29		Equant, anhedral.	Ti-rich magnetite is altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clay Minerals	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	10.0	Olivine, plagioclase.				Interstitial.
Albite	1.2	Plagioclase.				
Actinolite	6.2	Clinopyroxene.				Interstitial.
Quartz	0.4	Olivine.				Associated with chlorite.
Pyrite	Tr	Silicate minerals				Interstitial (10-100 microns).
Chalcopyrite	Tr	Interstitial				Inclusions in plagioclase (5-30 microns).
Magnetite	Tr	Olivine, clinopyroxene.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Rare clinopyroxene-plagioclase clots. Small plagioclase-dominated clots contain magnetite inclusions. Clots of parallel plagioclase laths (cumulate?) are present, one with spinel. Plagioclase forms 1) core with 10-micron round or 100-micron irregular glass inclusions, 2) equant (1-mm) phenocryst with uniform core, oscillatory zoned mantle, and normal rim, 3) glomerophytic (2x2 mm) cluster of complexly zoned plagioclase.

140-504B-209R-02 (Piece 4, 30-33 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 240.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Seriate porphyritic.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.8	0.32-2.03		Equant, euhedral.	Completely altered.
Plagioclase	7.0	7.0	0.78-3.25		Subhedral.	Variety of zoning patterns.
Clinopyroxene	0.6	1.2	1.02-3.77	Augite.	Anhedral.	Inclusion-free cores with ophitic rims.
Spinel	Tr	Tr	0.07		Euhedral.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	45.0	50.0	0.58-1.07		Thick laths.	
Clinopyroxene	28.6	36.2	0.44-1.22	Augite.	Anhedral.	Ophitic, rarely zoned.
Opaque minerals	1.0	2.8	0.10-0.29		Equant, subhedral.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	0.8	Olivine, plagioclase.				Mixed-layer chlorite-smectite, interstitial.
Clay minerals	Tr	Olivine.				Smectite.
Chlorite	5.0	Olivine, plagioclase.				Interstitial.
Albite	0.4	Plagioclase.				
Actinolite	10.8	Clinopyroxene, olivine.				Interstitial, associated with chlorite after olivine.
Quartz	Tr	Olivine.				
Talc	0.8	Olivine.				Interstitial.
Hematite	Tr	Olivine.				After secondary magnetite. Pyrite and chalcopyrite are also present in trace amounts replacing silicate minerals, and as inclusions in plagioclase (10-100 microns). Chalcopyrite occurs in altered olivine.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Proto-gabbroic clots, some with pockets of trapped liquid and locally developed resorption textures. Some clots are enriched in primary-textured minerals. Plagioclase occurs as 1) glomerocryst (2x1 mm) with unzoned grains except at rim, 2) reversely zoned (1x0.7 mm) phenocryst, 3) normally zoned (1x1 mm) phenocryst with glass inclusions, and 4) phenocryst with oscillatory zoning. Spinel forms 1) euhedral (70 micron) reddish-brown grain with no black rim or inclusions in subhedral (0.7x0.35 mm) plagioclase, and 2) dark reddish-brown inclusion in plagioclase glomerocryst in (1) above.

SITE 504

140-504B-210R-01 (Piece 4C, 36-39 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 241.

ROCK NAME: Moderately olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPO-SITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	2.4	0.73-1.28		Equant, euhedral.	Completely altered.
Plagioclase	1.2	1.0	0.73-2.35		Euhedral to subhedral.	Variety of zoning types.
Clinopyroxene	Tr	Tr	2.10	Augite.	Anhedral.	Ophitic.
GROUNDMASS						
Plagioclase	52.0	49.0	0.7-1.97		Laths.	Acicular, skeletal, and branching crystals.
Clinopyroxene	33.8	45.6	0.26-1.39	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.8	2.0	0.12-0.26		Equant, skeletal.	Partially altered to titanite, ilmenite exsolution.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	0.2	Olivine.				Smectite.
Clay minerals	0.2	Olivine.				Talc-smectite.
Chlorite	1.0	Interstitial.				
Actinolite	4.4	Clinopyroxene.				Interstitial, vein.
Talc	3.8	Olivine.				Interstitial.
Serpentine	0.6	Olivine.				
Pyrite+ chalcopyrite	Tr	Olivine, silicate minerals.				As inclusions in plagioclase and olivine up to 350 microns in size.
Magnetite	Tr	Olivine.				
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	Actinolite	?	?	?	Actinolite vein (100 microns in size).

COMMENTS: Plagioclase-dominated crystal clots and plagioclase oikocrysts including plagioclase, rare augite, and opaque minerals. Plagioclase occurs as 1) reversely zoned phenocryst (2x1 mm) with glass inclusions; 2) clots of laths with cumulate texture and unzoned irregular plagioclase grains; 3) oscillatory zoned phenocrysts (1 mm), and 4) complex zoning of phenocryst-core (0.5x0.5 mm) followed by 2 oscillations, 50 microns apart, followed by rim. Augite contains plagioclase inclusions and inclusions attached to rim, suggesting multiple episodes of plagioclase crystallization. Spinel forms reddish-brown (40-micron) inclusions in plagioclase adjacent to olivine. Plagioclase (2.3x0.5 mm) exhibits normal zoning. Olivine (1x0.9 mm) forms altered phenocrysts.

140-504B-210R-01 (Piece 11, 73-77 cm)

OBSERVER: SBF

WHERE SAMPLED: Unit 241.

ROCK NAME: Moderately olivine-plagioclase phyric diabase.

GRAIN SIZE: Fine-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.4	0.75-1.31		Equant, subhedral.	Completely altered.
Plagioclase	1.2	1.2	0.87-1.94		Subhedral, anhedral.	Generally simple zoning, euhedral core surrounded by subhedral rim.
Spinel	Tr	Tr	0.04		Euhedral.	Red to yellow to brown inclusions in phenocrysts.
GROUNDMASS						
Plagioclase	41.0	52.3	0.46-2.20		Thick laths.	Acicular, skeletal and branching crystals.
Clinopyroxene	8.4	42.1	0.44-1.86	Augite.	Anhedral.	Ophitic to poikilitic. Altered to titanite, exsolution lamellae.
Opaque minerals	1.8	2.7	0.12-0.35		Equant, skeletal.	
SECONDARY MINERALOGY						
Chlorite	0.8	REPLACING/ FILLING				COMMENTS
		Olivine.				Associated with minor magnetite, pyrite, and serpentine(?), and in veinlets through plagioclase.
Albite	2.0	Plagioclase.				
Actinolite	44.6	Pyroxene, plagioclase.				Vein-filling, interstitial.
Quartz	0.2	Interstitial.				
Serpentine	Tr	Olivine.				Associated with chlorite, and minor magnetite and pyrite.
Magnetite	Tr	Olivine.				In actinolite.
Pyrite	Tr	Olivine.				
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
						None.

COMMENTS: Network of amphibole (pleochroic, light-green, locally brownish-green, well-crystallized). The whole rock is extensively altered due to the vein density, but is lacking halos. Glomerocrysts of aligned plagioclase laths (cumulate texture?). Spinel forms 1) altered euhedral red opaque grains in olivine; 2) euhedral yellowish-brown (40-micron) in core of subhedral plagioclase (1x0.3 mm) with normal zoning; 3) dark reddish-brown inclusion in unzoned plagioclase phenocryst.

SITE 504

140-504B-211R-01 (Piece 11,48-51 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 241.

ROCK NAME: Moderately plagioclase-olivine pyritic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.35-1.48		Equant, euhedral.	Completely altered.
Plagioclase	1.9	1.9	0.81-2.03		Subhedral.	Unzoned, normally zoned, and oscillatory zoned; euhedral cores with anhedral rims are common.
Spinel	Tr	Tr	0.03-0.10		Rounded.	Inclusions in plagioclase, olivine, and augite.
GROUNDMASS						
Plagioclase	43.9	51.2	0.73-3.28		Thick laths.	Subhedral, acicular, skeletal, and branching crystals.
Clinopyroxene	27.8	43.1	0.49-1.33	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.2	2.8	0.15-0.41			Equant, skeletal. Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	2.6	Olivine.				Interstitial, associated with magnetite, pyrite, actinolite, quartz and in veins. Close to the veins.
Albite	1.0	Plagioclase.				Interstitial areas, associated with chlorite, in cracks.
Actinolite	20.0	Plagioclase, pyroxene.				Associated with pyrite, in core of altered olivine.
Quartz	0.6	Olivine.				Associated magnetite.
Serpentine	Tr	Olivine.				Associated with quartz, interstitial, replacing silicate minerals.
Pyrite	Tr	Olivine.				Interstitial, inclusions in plagioclase (10-20 microns).
Chalcopyrite	Tr	Olivine.				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.1-0.4 mm	Actinolite, chlorite.	?	None.

COMMENTS: Rare plagioclase phenocrysts have elongate augite inclusions. Some groundmass plagioclase has euhedral augite inclusions. Spinel forms 1) round symplectic magnetite (100 micron diameter) in zoned rim of euhedral plagioclase lath, 2) reddish-yellow (30 micron) round spinel in altered olivine, 3) in groundmass augite and plagioclase. Network of chlorite-actinolite veins (lesser amounts of chlorite). Actinolite is bluish-green. Alteration halos, 3 mm in width, rim veins.

140-504B-211R-01 (Piece 29, 129-131 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 241.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.67-1.57		Equant, euhedral.	Altered to talc, magnetite, and smectite.
Plagioclase	4.0	4.0	1.16-3.34		Subhedral.	Variety of zoning patterns.
Spinel	Tr	Tr	0.06		Subhedral, anhedral.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	51.2	50.6	0.58-1.83		Thick laths.	Elongate, acicular, and branching crystals.
Clinopyroxene	30.0	41.2	0.58-1.54	Augite.	Anhedral.	Poikilitic.
Opaque minerals	2.2	2.4	0.17-0.44		Equant, subhedral.	Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	0.2	Olivine.				Smectite.
Chlorite	0.6	Interstitial.				
Albite	0.2	Plagioclase.				
Actinolite	8.2	Clinopyroxene.				Interstitial.
Talc	3.4	Olivine.				Associated with magnetite.
Magnetite	Tr	Olivine.				
Pyrite	Tr	Olivine, silicate minerals.				Interstitial (10-50 microns).
Hematite	Tr	Olivine.				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase forms 1) phenocryst with rounded core and glass inclusions in center and 50-micron normally zoned rim; 2) same as 1, but without glass inclusions; 3) glomerocryst with unzoned plagioclase (with spinel). Spinel forms 1) irregular, anhedral (60x40 micron) reddish-brown grain in core of plagioclase lath (0.6x0.2 mm), 2) subhedral, reddish-brown grain (60 micron) in core of plagioclase grain in plagioclase glomerocryst; 3) reddish-yellow grain in some plagioclase grains.

SITE 504

140-504B-212R-01 (Piece 1B, 4-7 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 241.

ROCK NAME: Moderately olivine-plagioclase-pyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic to poikilitic groundmass.

PRIMARY MINERALOGY	PERCENT PERCENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.23-1.31		Equant, euhedral.	Completely altered.
Plagioclase	1.2	1.2	0.81-3.05		Euhedral to subhedral.	Zoned.
Clinopyroxene	Tr	0.6	1.36	Augite.	Anhedral.	Larger inclusion-free augite.
Spinel	Tr	Tr	0.02-0.15		Subhedral.	Chrome spinel included in plagioclase and in groundmass.
GROUNDMASS						
Plagioclase	49.4	52.4	0.70-1.80		Thick laths.	Some branching splays in augite.
Clinopyroxene	30.0	41.2	0.29-1.36	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.4	2.8	0.12-0.49		Equant to skeletal.	Partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Chlorite	0.8	Interstitial.				
Albite	0.4	Plagioclase.				
Actinolite	15.6	Clinopyroxene, interstitial, olivine?.				
Talc	12.0	Olivine.				
Magnetite	Tr	Actinolite, olivine.				Talc and interstitial associated with actinolite.
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Associated with actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: Large zoned plagioclase oikocrysts with inclusions of spinel, magnetite, and plagioclase. The following types of plagioclase are present: 1) grains that exhibit normal zoning with minor oscillations inside rim; 2) grain (0.5x0.5 mm) with numerous glass inclusions and zone with 2 oscillations inside rim. Spinel forms 1) 150-micron brown euhedral grain in the core of a plagioclase grain (2.5x0.6 mm) with normal zoning; 2) 20-micron dark reddish-brown euhedral grain in groundmass plagioclase (0.25 mm long).

140-504B-213R-01 (Piece 2,3-6 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 242.

ROCK NAME: Moderately plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.87-1.31			Equant, euhedral. Plucked during sample preparation.
Plagioclase	2.2	2.0	0.90-2.51			Subhedral, euhedral. Variety of zoning patterns.
Clinopyroxene	0.8	1.2	1.99-2.20	Augite.	Subhedral prisms.	Plagioclase inclusions.
GROUNDMASS						
Plagioclase	38.0	51.6	0.32-0.96			Laths. Subhedral to skeletal.
Clinopyroxene	36.8	41.8	0.09-0.26	Augite.	Euhedral granular.	Subophitic.
Opaque minerals	1.6	3.4	0.04-0.24			Equant subhedral.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	3.6	Plagioclase.				Interstitial.
Albite	0.6	Plagioclase.				
Actinolite	16.4	Clinopyroxene.				Interstitial, veins.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.3 mm	Actinolite, chlorite, albite.	?	May contain pyroxene.
Vein	?	?	0.2 mm	Actinolite, pyroxene(?), magnetite.	?	

COMMENTS: Vein minerals are included in point count. One plagioclase-augite-magnetite clot exhibits resorption textures. Plagioclase forms 1) unzoned or simple normal oscillatory zoning, 2) corroded anhedral disequilibrium lath (2.2x0.4 mm), 3) round inclusions in plagioclase, 4) glomerocryst (1.5x1.5 mm) with complex oscillatory zoning. Oscillations in core, 50-micron mantle with no oscillations, 50-micron zone of oscillations in rim-suggests 3 stages of plagioclase growth: a) core formation under changing conditions, b) mantle formation under constant conditions, and c) rim formation under changing conditions. Actinolite-chlorite vein is cut by actinolite-magnetite vein.

SITE 504

140-504B-213R-01 (Piece 11, 32-34 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 243.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.29-2.03		Equant, euhedral.	Altered to chlorite, actinolite, and mixed-layer chlorite-smectite.
Plagioclase	0.4	0.4	1.16-2.70		Euhedral, subhedral.	Normal zoning with uniform cores and thin rims.
Spinel	Tr	Tr	0.1		Euhedral.	Brown inclusions in plagioclase.
GROUNDMASS						
Plagioclase	46.2	52.2	0.67-1.80		Laths.	Euhedral, acicular, skeletal, and branching crystals.
Clinopyroxene	11.0	44.6	0.29-0.78	Augite.	Anhedral.	Ophitic to poikilitic, partially altered.
Opaque minerals	1.4	2.8	0.13-0.29		Equant, skeletal.	Ilmenite exsolution, partially altered to titanite.
SECONDARY MINERALOGY						
	REPLACING/PERCENT	FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	3.6	Plagioclase, olivine.				Interstitial.
Albite	0.6	Plagioclase.				
Epidote	Tr	Silicate minerals.				Interstitial (up to 0.4 mm).
Actinolite	36.8	Clinopyroxene.				Interstitial, vein.
Pyrite	Tr	Silicate minerals.				Interstitial, +/-chalcopyrite, inclusions in plagioclase (10-100 microns).
Chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase (2-10 microns).
Prehnite	Tr	Plagioclase.				Replacing plagioclase in fractures.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	1-2 mm	Actinolite.	?	None.

COMMENTS: Chilled margin (2-mm), glassy dikelet and 1- to 2-mm actinolite vein are not included in point count. Plagioclase exhibits simple, normal zoning with broad uniform cores (0.5 mm) and thin rims (0.05 mm). It also forms anhedral grains with uniform cores, and 0.1-mm rims with two oscillations. Euhedral spinel grains (100 microns, brown in color) are attached to 0.4-mm unzoned subhedral plagioclase, both enclosed by (2.5x0.7 mm) anhedral plagioclase.

140-504B-213R-01 (Piece 15, 45-47 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 243.

ROCK NAME: Sparsely plagioclase-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.0	0.35	1.74		Equant, euhedral.	Completely altered.
Plagioclase	1.0	0.8	0.73-2.32		Subhedral.	
Spinel	Tr	Tr	0.08		Anhedral.	Reddish-brown inclusion in plagioclase.
GROUNDMASS						
Plagioclase	41.6	53.8	0.67-1.94		Thick laths.	Euhedral, acicular, skeletal, and branching crystals.
Clinopyroxene	27.2	42.8	1.02-2.03		Anhedral.	Ophitic to poikilitic, partially altered.
Opaque minerals	1.8	1.6	0.15-0.26		Equant, skeletal.	Some altered to titanite.
SECONDARY MINERALOGY						
Chlorite	9.2			REPLACING/ FILLING Plagioclase, olivine.		Interstitial, locally associated with actinolite and titanite.
Albite	4.2			Plagioclase.		
Epidote	1.4			Olivine(?), clinopyroxene(?).		Interstitial.
Actinolite	13.6			Clinopyroxene.		Interstitial.
Titanite	Tr			Titanomagnetite.		Interstitial, associated with chlorite and actinolite at the rim of alteration patches.
Quartz	Tr	?				Interstitial, associated with epidote, in the center of alteration patches rimmed with chlorite, actinolite, and titanite.
Pyrite	Tr			Silicate minerals.		Rare sulfide minerals.
VESICLES/CAVITIES						
Veins	?		SIZE (mm) ?	FILLING Chlorite.	SHAPE ?	COMMENTS Three chlorite-rich veinlets in the chilled margin crosscut the contact with diabase. Other veinlets in the chilled margin terminate at this contact, or follow it.

COMMENTS: This section includes diabase with a crosscutting quenched basaltic dikelet. Description generally refers to the diabase. In the diabase, the quartz-epidote-bearing patches are distributed in an elongated area, roughly parallel to the chilled margin contact, but not in contact with it. Plagioclase forms clots with augite with both unzoned and oscillatory zoned plagioclase: uniform core, oscillatory zoned mantle, and normally zoned rim. Phenocrysts have the same zoning sequence. Included, pitted spinel grain occurs in the core of an euhedral (1.2x0.8 mm) unzoned plagioclase in glomerocryst.

SITE 504

140-504B-213R-01 (Piece 21, 79-83 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 243.

ROCK NAME: Moderately plagioclase-clinopyroxene phyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with cryptocrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	2.2	2.2	0.26-0.87		Euhedral, subhedral.	Euhedral normal and oscillatory zoned crystals, and subhedral, unzoned crystals.
Clinopyroxene	0.4	0.4	0.73-0.96	Augite.	Euhedral prisms.	Some with plagioclase inclusions.
GROUNDMASS						
Cryptocrystalline	69.1	69.1	?		Cryptocrystalline intergrowth.	Plagioclase and clinopyroxene with feathery chevron texture. Devitrified glass. Skeletal.
Plagioclase	14.4	14.4	0.09-0.26		Fine laths.	Skeletal.
Clinopyroxene	9.4	9.4	0.05-0.10	Augite.	Anhedral laths.	Quench crystals.
Opaque minerals	4.5	4.5	0.02-0.11		Equant, euhedral.	
SECONDARY MINERALOGY						
Chlorite	Tr	REPLACING/ FILLING				COMMENTS
Albite	Tr	Plagioclase phenocrysts.				
Pyrite	Tr	Plagioclase phenocrysts.				Interstitial.
Chalcopyrite	Tr	Silicate minerals.				Interstitial.
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
						None.

COMMENTS: The section contains very small intergrowths of euhedral clinopyroxene and plagioclase or only plagioclase. The latter may include very fine grains of opaque minerals.

140-504B-214R-01 (Piece 5A, 24-28 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Moderately plagioclase phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1.83	3.3	2.32		Anhedral	Glomeroporphyritic clots, fragmented.
GROUNDMASS						
Plagioclase	13.6	50.0	0.87-2.52		Thick laths.	Euhedral to subhedral laths.
Clinopyroxene	0.2	44.0	0.87-2.32		Anhedral.	Extensively replaced by green amphibole.
Opaque minerals	0.8	3.0	0.15-0.25		Equant, subhedral.	Extensively replaced by titanite.
SECONDARY MINERALOGY						
Chlorite	1.4	REPLACING/ FILLING				COMMENTS
Albite	10.6	Plagioclase.				Interstitial.
Actinolite	70.4	Plagioclase.				Pleochroic green, well-developed crystals.
Chalcopyrite	Tr	Clinopyroxene, plagioclase.				Only one (2-micron) grain observed in actinolite.
Magnetite	Tr	Clinopyroxene.				Included in amphibole.
VESICLES/CAVITIES						
Amygdules	10.0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
		Throughout.	5x7 mm	Green amphibole.	Rounded.	Smaller interstitial areas also of green amphibole.

COMMENTS: Primary point count approximate due to extensive alteration. Plagioclase, and less commonly altered clinopyroxene, form crystal clots. Significant amounts of proto-gabbroic (plagioclase+clinopyroxene+magnetite) clusters were present prior to alteration. Amygdules are included in point count.

140-504B-214R-01 (Piece 8,76-78 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Altered diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	?	0.58-1.74		Equant, euhedral.	Replaced by actinolite.
Plagioclase	?	?	1.54-3.28		Euhedral, subhedral.	Extensively altered.
Spinel	Tr	Tr	0.05-0.10		Euhedral, anhedral.	Equant inclusions in plagioclase and in groundmass. Zoned with more reflective (Fe-rich) rims.
GROUNDMASS						
Plagioclase	2.4	?	1.60		Thick laths, blades.	Extensively altered and branching laths.
Clinopyroxene	0	?	0.52-2.96		Anhedral.	Completely altered, ophitic to poikilitic crystals.
Opaque minerals	0.4	?	0.17-0.38		Equant, skeletal.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	13.8	Plagioclase.				Amygdules.
Epidote	3.3	Amygdules.				Center of amygdules with quartz and actinolite.
Actinolite	65.0	Pyroxene.				Amygdules (mainly in the outer rim).
Quartz	0.6	Amygdules.				Center of amygdules with epidote and actinolite.
Anhydrite	3.8	Plagioclase.				
Prehnite	5.4	Amygdules.				
Laumontite	8.6	Amygdules.				
Pyrite+ chalcopyrite	Tr	Actinolite.				Pyrite in 1 grain, chalcopyrite as inclusions in plagioclase.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	30	Throughout.	5-12	See comments.		Irregular. Filled with actinolite epidote, laumontite, prehnite(?), and colorless amphibole(?).

COMMENTS: Alteration is too pervasive to obtain meaningful primary mode. Rare sulfide minerals.

SITE 504

140-504B-214R-01 (Piece 18, 126-129 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

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

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic pyroxene.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.4	0.78-1.77		Equant, euhedral.	Altered to talc, serpentine, smectite.
Plagioclase	4.0	4.0	1.10-2.64		Subhedral to anhedral.	Typically subhedral with euhedral cores with slight oscillations surrounded by a mantle of multiple oscillations and a normal rim.
Clinopyroxene	7.4	7.4	1.10-5.74	Augite.	Anhedral.	Ophitic to poikilitic.
Spinel?	?	Tr	0.07-0.10		Euhedral to anhedral.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	53.4	52.0	1.02-2.11		Thick laths.	
Clinopyroxene	22.4	31.0	0.44-1.33	Augite.	Anhedral.	
Opaque minerals	3.6	2.2	0.12-0.26		Equant, subhedral.	Partly altered to titanite. Ilmenite exsolution.
SECONDARY MINERALOGY						
Clays	0.4	REPLACING/ FILLING	Olivine.			Serpentine.
Clays	Tr		Olivine.			Smectite.
Albite	0.4		Plagioclase.			
Actinolite	4.6		Clinopyroxene.			Interstitial.
Talc	3.8		Olivine.			
Pyrite+ chalcopyrite	Tr		Interstitial.			Pyrite replaces silicate. Inclusions in plagioclase, 4-100 microns. Chalcopyrite as inclusions in plagioclase.
Quartz	Tr		Olivine.			
Hematite	Tr		Olivine.			2- to 5-micron clots in smectite, serpentine.
VESICLES/CAVITIES						
Vesicles	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
	?	?		?	?	None.

COMMENTS: Pyrrhotite as 2-micron inclusions in pyrite. Proto-gabbroic and anorthositic clots. Spinel: Several types are present in this unit: 1) dark reddish-brown euhedral equant grains about 70 microns diameter in the cores of normally zoned plagioclase; 2) yellowish-brown to black anhedral equant 100-micron grain in rim of plagioclase lath; 3) some spinel grains include glass (20 microns diameter) and have symplectic rims. Three phases on liquidus: Plagioclase, yellowish-brown spinel, and olivine.

140-504B-214R-02 (Piece 7, 29-32 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.4	0.78-2.03		Equant, euhedral.	Altered to actinolite?
Plagioclase	6.4	6.4	1.02-2.76		Subhedral.	Variety of zoning types.
GROUNDMASS						
Plagioclase	34.6	48.8	0.38-1.60		Thick laths to blades.	Some skeletal and branching crystals.
Clinopyroxene	12.0	42.4	0.44-3.34	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	0.6	1.0	0.09-0.44		Equant, subhedral.	Ilmenite exsolution, extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.6	Interstitial, amygdules.				
Albite	4.2	Plagioclase.				
Actinolite	38.0	Pyroxenes, plagioclase, interstitial				Also fills amygdules.
Laumontite	1.0	Amygdules.				
Anhydrite	Tr	Albite.				Replaces albite which replaces plagioclase.
Prehnite	0.4	Plagioclase.				
Pyrite+ chalcopyrite	Tr	Plagioclase.				Inclusions in plagioclase (10 microns).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	1	?	1.0	?	Irregular.	Amygdules show zoned filling: outer chlorite and actinolite, inner laumontite.

COMMENTS: Extremely rare sulfide minerals. Proto-gabbroic and proto-anorthositic clots with small amount of primary-textured magnetite. Clots are well compacted and contain no resorption textures. Plagioclase occurs in the following types: 1) Subhedral core with 100-micron altered glass inclusions, a euhedral oscillatory zoned mantle 50 microns wide, and a 200-micron-wide rim; 2) square, euhedral plagioclase (2x2 mm) with normal zoning; 3) oscillatory zoned phenocryst with rim and core of approximately equal composition; 4) smaller grain (0.6x0.3 mm), reversely zoned. (First type is most common).

SITE 504

140-504B-214R-02 (Piece 20, 88-90 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Highly clinopyroxene-olivine-plagioclase phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Porphyritic with ophitic to poikilitic pyroxene.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.2	0.17-1.71		Equant, euhedral.	Completely altered.
Plagioclase	3.0	2.8	1.10-1.91		Subhedral.	Variety of zoning and inclusion patterns.
Clinopyroxene	5.0	6.4	1.28-3.10	Augite.	Anhedral.	Ophitic to poikilitic with plagioclase and olivine inclusions.
Spinel	Tr	Tr	0.05		Anhedral.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	48.6	52.0	0.52-2.15		Thick-thin laths.	Subhedral to skeletal, some normally zoned.
Clinopyroxene	26.4	33.0	0.47-1.57	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	3.0	2.6	0.15-0.41		Equant, subhedral.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	4.2	Olivine, plagioclase.				
Actinolite	6.6	Clinopyroxene.				Interstitial.
Quartz	2.6	Olivine.				Associated with chlorite.
Talc	0.6	Olivine.				
Pyrite+chalcopyrite	Tr	Silicate minerals.				Interstitial, pyrite as inclusions in plagioclase (0.01-1.0 mm), chalcopyrite is intergrown with magnetite.
Magnetite	Tr	Olivine.				
Hematite	Tr	Olivine.				

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase exhibits a variety of morphologies: 1) anhedral (1x0.7 mm) grain with gradual extinction and abundant 5- to 50 micron altered glass inclusions; 2) normally zoned grain (0.6-0.2 mm) with uniform core and 10- to 50-micron wide rim, and several uniform (0.5-1.0 mm) euhedral laths and anhedral, unzoned corroded plagioclase fragments; 3) subhedral to anhedral (0.3-0.6 mm) unzoned grains in center of plagioclase glomerocryst; 4) 2-mm anhedral phenocryst with uniform core, abrupt change in lower anorthite rim, and 200-micron glass inclusion in core. Spinel forms 1) yellowish-brown, equant, euhedral, 50-micron inclusions between core and mantle of plagioclase phenocryst; 2) reddish-brown equant anhedral grain in 1x0.5-mm clot of 3 euhedral plagioclase grains. Crystallization order is plagioclase, plagioclase+spinel, plagioclase+augite. The time of crystallization of olivine is not constrained but probably came after plagioclase. Proto-gabbroic clot.

140-504B-214R-02 (Piece 22, 100-103 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with poikilitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	3.8	0.20-1.51		Equant, euhedral.	Completely altered.
Plagioclase	3.8	3.8	0.64-2.55		Subhedral.	Variety of zoning patterns.
Spinel	?	Tr	0.03		Subhedral to anhedral.	As inclusions in plagioclase.
GROUNDMASS						
Plagioclase	51.6	55.8	0.41-2.38		Thick laths to blades.	Some skeletal crystals.
Clinopyroxene	29.6	33.2	0.17-2.20	Augite.	Anhedral.	Poikilitic, weak zoning.
Opaque minerals	1.6	3.4	0.13-0.29		Equant to skeletal.	Partly altered to titanite, ilmenite exsolution.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Olivine.				Mixed-layer chlorite-smectite, serpentine?.
Chlorite	6.0	Olivine, interstitial.				
Actinolite	6.4	Clinopyroxene, olivine.				
Quartz	1.0	Olivine.				
Magnetite	Tr	Olivine, clinopyroxene.				Associated with actinolite.
Anhydrite	Tr	Olivine.				
Pyrite+ chalcopyrite	Tr	Silicate minerals, interstitial.				Pyrite: 10-200 microns, overgrowth on titanomagnetite. Chalcopyrite: 2-50-microns, inclusions in magnetite and plagioclase.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENT
Vesicles	0					None.

COMMENTS: Plagioclase is present in the following types: 1) euhedral phenocrysts with uniform core, oscillatory zoned mantle and normally zoned rim; 2) composite grain (1x0.8-mm) with continuous but irregular zone of 10-micron round glass inclusions, uniform core and zoned rim; 3) plagioclase glomerocryst. Type 1) is the most common. Spinel occurs in the following types: 1) in unzoned grain in a plagioclase glomerocryst; 2) 5 subhedral to anhedral reddish to yellowish-brown equant phenocryst 50-90 microns in diameter, one with glass inclusion; 3) 30-micron reddish-brown equant inclusion in (70x30 micron) plagioclase groundmass laths.

SITE 504

140-504B-214R-02 (Piece 25,130-132 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Moderately plagioclase-olivine pyritic diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.6	0.37-2.03		Equant, euhedral.	Altered to actinolite.
Plagioclase	3.1	3.4	0.75-4.21		Subhedral.	Euhedral zoned or unzoned cores with anhedral rims.
GROUNDMASS						
Plagioclase	21.1	51.6	0.44-1.96		Thick laths, blades.	
Clinopyroxene	0	41.8	0.87-2.32	Augite.	Anhedral.	Completely altered, ophitic to poikilitic.
Opaque minerals	1.6	2.6	0.15-0.42		Equant, skeletal.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	1.6	Plagioclase.				Interstitial, amygdules.
Albite	18.2	Plagioclase.				
Actinolite	53.8	Clinopyroxene, olivine.				Amygdules.
Titanite	?	Titanomagnetite.				
Anhydrite	0.2	Plagioclase.				
Laumontite	0.4	Amygdules.				
Magnetite	?	Clinopyroxene.				In actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	5.0	One side.	2-5	See comments.		Irregular. Most are filled with actinolite, however one is zoned with chlorite+actinolite, and laumontite.

COMMENTS: Extensively altered augite, opaque minerals, and olivine, therefore, the primary mode is imprecise. Some augite-plagioclase (proto-gabbroic) crystal clots are present.

140-504B-215R-01 (Piece 1, 0-4 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 244.

ROCK NAME: Moderately plagioclase-olivine pyritic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with aphanitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	?	3.6	0.20-1.65		Equant, euhedral.	Completely altered.
Plagioclase	5.4	5.4	0.99-3.31		Subhedral.	Glomeroporphyritic, completely zoned.
Spinel	?	?	0.20		Anhedral.	Chrome spinel interstitial and as black, rounded inclusions in plagioclase.
GROUNDMASS						
Plagioclase	47.8	49.6	0.70-1.52		Thick laths, blades.	Subhedral zoned crystals, skeletal crystals, and splays of branching crystals.
Clinopyroxene	29.2	38.2	0.38-1.45	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.2	1.2	0.09-0.35		Equant to skeletal.	Partly altered to titanite.
SECONDARY MINERALOGY						
	REPLACING/PERCENT	FILLING				COMMENTS
Clays	0.2	Olivine.				Smectite.
Chlorite	3.0	Olivine, interstitial.				
Albite	0.2	Plagioclase.				
Actinolite	10.8	Clinopyroxene, interstitial, plagioclase.				
Quartz	1.0	Olivine.				
Talc	1.2	Olivine.				Associated with magnetite.
Magnetite	Tr	Olivine.				Associated with talc.
Pyrite+ chalcopyrite	Tr	Silicate minerals, interstitial.				10-100, 10-50 microns, inclusions in plagioclase.

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

COMMENTS: Proto-gabbroic and proto-anorthositic clots are enriched in opaque minerals. Many proto-gabbroic clots contain pockets of crystallized trapped magma. Rare plagioclase oikocrysts contain augite and plagioclase chadacrysts. The following types of plagioclase are present:

- 1) phenocryst (1x0.6-mm) with 3 broad bands of oscillations (50 microns wide) separating core and rim; 2) unzoned 1.4x0.5-mm phenocryst;
- 3) glomerocryst of unzoned grains; 4) 1.5-mm equant grain with 0.8-mm corroded core with irregular glass patches; 5) phenocryst with uniform core and mantle. Core contains numerous 5- to 50-micron glass inclusions (one up to 100 microns) aligned with twin planes. Mantle and rim are inclusion-free.

SITE 504

140-504B-216R-01 (Piece 13, 58-60 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 245.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic, microcrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.2	0.23-1.16		Equant, euhedral.	
Plagioclase	Tr	Tr	0.73-1.45		Subhedral.	Glomeroporphyritic clusters with augite.
Clinopyroxene	Tr	Tr	4.35	Augite.	Subhedral, elongate	Ophitic with inclusion-free core. prisms.
GROUNDMASS						
Plagioclase	48.0	53.0	0.44-0.83		Laths.	Some acicular to skeletal crystals.
Clinopyroxene	30.6	44.0	0.20-0.44	Augite.	Anhedral.	Subophitic.
Opaque minerals	1.6	2.8	0.05-0.08		Equant, skeletal.	Extensively altered (80%-90%) to titanite.
SECONDARY MINERALOGY						
Clay minerals	2.4			REPLACING/ FILLING		COMMENTS
				Olivine.		Interstitial, mixed-layer chlorite-smectite.
Chlorite	2.2			Olivine.		Interstitial.
Albite	4.6			Plagioclase.		
Epidote	2.0			Plagioclase.		Interstitial, vein.
Actinolite	8.0			Clinopyroxene.		Interstitial.
Quartz	0.4			Vein.		
Prehnite	0.2			Plagioclase.		
Pyrite+ chalcopyrite	Tr			Silicate minerals.		Interstitial, in veins (0.01-1.22 mm).
VESICLES/CAVITIES						
Vein	?	?	0.8 mm	FILLING	SHAPE	COMMENTS
				Actinolite, quartz, pyrite, prehnite.	?	
Vein	?	?	1 mm	See comments.	?	Epidote, actinolite, chlorite, quartz, pyrite, and chalcopyrite.

COMMENTS: Veins not included in point count.

140-504B-216R-01 (Piece 14, 66-68 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 245.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.6	0.44-0.70		Equant, euhedral.	Completely altered.
Plagioclase	2.0	1.6	0.81-3.71		Subhedral.	Zoned, altered, common in glomerocrysts.
Clinopyroxene	0.2	0.2	0.58-0.90	Augite.	Subhedral prisms.	Ophitic, zoned.
GROUNDMASS						
Plagioclase	46.2	51.8	0.32-1.16		Laths.	Euhedral, skeletal, and acicular crystals.
Clinopyroxene	41.8	42.8	0.17-0.75	Augite.	Anhedral.	Subophitic.
Opaque minerals	2.0	3.0	0.35-1.16		Equant, skeletal.	Partially altered to titanite.
Quartz-albite	0.8	?	?	?	Granophyre.	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	5.4	Olivine, plagioclase.				Interstitial.
Albite	0.8	Plagioclase.				
Actinolite	0.8	Clinopyroxene.				
Pyrite	Tr	Silicate minerals.				Interstitial, inclusions in plagioclase (10-100 microns).
Chalcopyrite	Tr	?				Inclusions in plagioclase (5-30 microns).

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0	0				None.

COMMENTS: Plagioclase forms clot (2x4 mm) of euhedral to subhedral grains with parallel alignment, and appears as 4 types in clots: 1) grains on the outside of the clot exhibit oscillatory zoned mantle and normal rim; 2) grains in the interior of the clot are unzoned; 3) largest grain in clot has (100-micron) altered glass inclusion in core; 4) zoned plagioclase fragments.

140-504B-217R-01 (Piece 1, 0-2 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 245.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.4	0.61-0.87		Equant euhedral.	Completely altered.
Plagioclase	4	4.4	0.75-2.41		Subhedral.	Unzoned, partially altered.
GROUNDMASS						
Plagioclase	12.6	48.0	0.46-1.04		Laths.	Subhedral to skeletal.
Clinopyroxene	33.4	43.8	0.26-0.73	Augite.	Anhedral.	Rounded to subophitic.
Opaque minerals	4.4	2.4	0.09-0.25		Equant, subhedral.	Magnetite is altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	10.4	Olivine.				Interstitial.
Albite	21.6	Plagioclase.				
Epidote	5.8	Plagioclase.				Interstitial.
Actinolite	6.0	Clinopyroxene.				
Prehnite	1.4	Plagioclase.				
Anhydrite	0.4	Plagioclase.				
Pyrite + chalcopyrite	Tr	Olivine.				Interstitial to alteration (chlorite) zones.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	1-3 mm	See comments.	?	Vein with anhydrite, prehnite, epidote, actinolite, chlorite, and quartz.

COMMENTS: Plagioclase+augite clots and well-compacted anorthositic clot with minor opaque oxide inclusions.

SITE 504

140-504B-217R-01 (Piece 1,4-6 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 245

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	1.0	0.4	0.78-1.57		Subhedral.	Partially altered.
Clinopyroxene	0.2	0.2	0.44-1.19		Subhedral, anhedral.	
GROUNDMASS						
Plagioclase	11.4	50.6	0.35-1.10		Laths.	Acicular to skeletal.
Clinopyroxene	24.6	46.4	0.13-0.52	Augite.	Anhedral.	Rounded to subophitic.
Opaque minerals	1.8	2.4	0.07-0.18		Equant, subhedral.	Pervasively altered to titanite (95%).
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Chlorite-smectite mixed-layer.
Chlorite	29.8	Amygdules, plagioclase, olivine.				
Albite	25.4	Plagioclase.				
Actinolite	1.6	Clinopyroxene.				
Titanite	Tr	Amygdules.				
Quartz	Tr	?				
Prehnite	0.5	Plagioclase.				
Pyrite + chalcopyrite	Tr	Olivine.				Associated with chlorite.
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Amygdules	25	Throughout.	1-5 mm	Chlorite.	Irregular.	Zoned fillings of vugs: 1) epidote chlorite+titanite at rim, 2) epidote at center of vug.

COMMENTS: Extensively altered rock around amygdules. One augite-plagioclase, well-compacted, proto-gabbroic clot in equilibrium with groundmass.

140-504B-217R-01 (Piece 6,23-26 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 246.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.2	0.87-2.00		Equant, euhedral.	Completely altered.
Plagioclase	6.0	8.0	1.16-4.38		Euhedral, subhedral.	Partially altered to chlorite and albite.
Clinopyroxene	2.2	2.0	1.39-3.57	Augite.	Anhedral prisms.	Ophitic, zoned, some with plagioclase inclusions in core.
Spinel	Tr	Tr	0.12		Anhedral.	Reddish-brown equant inclusions in plagioclase and plagioclase-augite laths.
GROUNDMASS						
Plagioclase	45.4	45.0	0.67-0.96			Thin, thick laths. Zoned subhedral crystals, acicular to skeletal crystals.
Clinopyroxene	34.2	37.6	0.26-0.73	Augite.	Anhedral.	Ophitic.
Opaque minerals	3.4	3.8	0.06-0.19		Equant, subhedral.	Partially altered to titanite, some exsolution lamellae.
Groundmass	1.2	1.4	?			Granophyric, interstitial.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Clay minerals	1.0	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	5.6	Olivine.				Interstitial.
Actinolite	0.4	Clinopyroxene.				
Quartz	0.6	Olivine.				Associated with mixed-layer chlorite-smectite.
Magnetite	Tr	Olivine.				Associated with chlorite.
Pyrite + Chalcopyrite	Tr	Olivine, silicate minerals.				Included in plagioclase, replacing olivine, interstitial to groundmass.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase phenocrysts form 1) mottled (2-mm) crystals with rounded core containing numerous inclusions, 100-micron oscillatory zoned mantle with a polyhedral exterior and a 50- to 100-micron rim; 2) phenocrysts greater than 1 mm with altered glass and round plagioclase inclusions. In clots they occur as 1) unzoned, anhedral grains and subhedral zoned laths; 2) clot (1.6x2 mm) of plagioclase grains with concentric zone of altered glass inclusions, an oscillatory zoned mantle, and rim with spinel inclusions.

SITE 504

140-504B-218R-01 (Piece 7,24-27 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 247.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic microcrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Clinopyroxene	Tr	Tr	0.50-0.80	Augite.	Subhedral.	Equant crystals with plagioclase inclusions.
GROUNDMASS						
Plagioclase	53.0	57.8	0.32-0.73		Laths.	Subhedral to skeletal, normally zoned and unzoned.
Clinopyroxene	17.2	39.4	0.15-0.70	Augite.	Anhedral.	Intergranular to subophitic, altered.
Opaque minerals	2.4	2.8	0.09-0.23		Equant, skeletal.	Magnetite extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	0.8	Silicate minerals, clinopyroxene.				After plagioclase, and interstitial phase.
Albite	0.8	Plagioclase.				
Epidote	Tr	Plagioclase.				
Actinolite	25.8	Silicate minerals, clinopyroxene.				Interstitial.
Magnetite	Tr	Clinopyroxene.				Associated with amphibole.
Pyrite	Tr	Plagioclase.				Inclusions in plagioclase, interstitial to chlorite and actinolite (10-50 microns).
Chalcopyrite	Tr	Interstitial.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	?	?	See comments.	?	Four thin (100-micron) veinlets of chlorite, actinolite, and titanite.

140-504B-219R-01 (Piece 3,7-11 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 249.

ROCK NAME: Aphyric basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	Tr	0.40-0.60		Equant, euhedral.	Completely altered microphenocrysts.
Plagioclase	5.0	5.0	0.15-0.60		Subhedral to euhedral.	Microphenocrysts, partly altered to albite and chlorite.
Clinopyroxene	4.0	4.0	0.04-0.08	Augite.	Subhedral.	Microphenocrysts, partly altered to actinolite.
Opaque minerals	1.0	1.0	0.08-0.30		Anhedral.	Sulfide minerals.
GROUNDMASS						
Plagioclase	?	?	0.07-0.19		Tiny laths.	Flow fabric alignment.
Clinopyroxene	?	?	0.04-0.11		Euhedral prisms.	Partly altered to actinolite.
Opaque minerals	?	?	0.01-0.22		Equant to skeletal.	Mostly altered to titanite.
Microcrystalline	90	90	?	?	?	Consists primarily of plagioclase, augite, and opaque minerals, but is too fine-grained to be point-counted.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	?	Plagioclase, groundmass.				
Actinolite	?	Clinopyroxene, interstitial.				
Pyrite	Tr	Groundmass.				Up to 100 microns.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	?	?	?	?	?	None.

COMMENTS: A 2-mm-wide zone of medium-grained diabase (plagioclase up to 2 mm) separates aphanitic basalt with abundant micro-glomerocrysts of olivine and plagioclase on one side from aphanitic basalt with aligned euhedral plagioclase and augite microphenocrysts on the other. Coarse zone approximately 50% plagioclase, 35% augite, 5% olivine, 3% opaque minerals, and 7% groundmass. Actinolite vein (20-120 microns) and actinolite+chlorite patch (2.0x0.5 mm) in aphanitic host.

140-504B-220R-01 (Piece 1,2-4 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 251.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyrlic basalt

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.2	0.58-0.99		Equant, euhedral.	Totally altered.
Plagioclase	?	4.0	0.29-1.04		Subhedral, euhedral.	Partially altered to albite and chlorite.
Clinopyroxene	?	1.0	0.38-0.58	Augite.	Anhedral, granular.	Partially altered.
GROUNDMASS						
Plagioclase	?	50.0	0.17-0.73		Laths.	Subhedral to skeletal.
Clinopyroxene	?	43.8	0.11-0.31	Augite.	Feathery.	Partially altered to actinolite, quench texture.
Opaque minerals	?	3.0	0.06-0.15		Euhedral, skeletal.	

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	0.4	Actinolite.	?	None.
Vein	?	?	0.4	Actinolite.	?	

COMMENTS: Sample is too fine-grained to obtain meaningful point-count data for alteration minerals. Overall, the sample is moderately altered (20%). Plagioclase forms subhedral laths (1x2 mm) with oscillatory zoning, equant euhedral phenocryst (1x1 mm) with uniform core, oscillatory zoned mantle (0.1 mm wide) and a 10-micron-wide rim. Parallel light-green actinolite veinlets, 40-microns wide, locally with cross-fiber texture and locally associated with magnetite. Rimmed by diffuse light-green, 300-micron alteration halo. One dirty brownish, very fine-grained actinolite veinlet (40 microns wide), perpendicular to the light-green actinolite veinlets. No associated alteration halo. The vein is cut by the light-green actinolite vein.

140-504B-220R-01 (Piece 7, 27-30 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 252.

ROCK NAME: Moderately olivine-plagioclase phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.61-0.73		Equant, euhedral.	Completely altered.
Plagioclase	2.4	1.0	0.81-2.41		Subhedral.	Zoned, partially altered.
GROUNDMASS						
Plagioclase	40.2	50.6	0.61-1.91		Thin, thick laths.	Acicular, skeletal, and branching crystals.
Clinopyroxene	38.8	43.8	0.20-1.19	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.4	2.8	0.10-0.35		Equant, subhedral.	Magnetite with exsolution lamellae are extensively altered to titanite.
Granophyre	0.2	?	?	?	?	
SECONDARY MINERALOGY						
Chlorite	6.4	REPLACING/ FILLING				COMMENTS
Albite	3.0	Olivine, plagioclase.				Interstitial.
Actinolite	6.4	Plagioclase.				Interstitial.
Quartz	Tr	Clinopyroxene.				
Prehnite	0.2	Olivine.				
Magnetite	Tr	Plagioclase.				In amphibole.
Pyrite + chalcocpyrite	Tr	Olivine.				Included in plagioclase, interstitial to groundmass.
SILICATE MINERALS, OLIVINE.						

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Anorthositic and troctolitic proto-clots. Plagioclase in clots has irregularly distributed primary melt inclusions and corroded cores. Plagioclase forms 1) clot with a repeating zoning pattern (0.1 mm) each, 2) phenocryst with normal zoning, and 3) unzoned phenocrysts. In an olivine clot, the unzoned plagioclase has a core with glass inclusions (10-100 microns).

SITE 504

140-504B-221R-01 (Piece 2,4-7 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 253.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with granular groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	4.2	0.75-1.62		Equant, euhedral.	Replaced by chlorite.
Plagioclase	8.0	8.4	0.78-2.38		Subhedral.	
Clinopyroxene	2.4	3.4	1.10-4.29	Augite.	Subhedral prisms.	Inclusion-free cores with inclusion-free to slightly ophitic rims, slightly zoned.
GROUNDMASS						
Plagioclase	47.4	45.0	0.13-0.32		Laths.	Subhedral to skeletal.
Clinopyroxene	31.4	32.0	0.05-0.19	Augite.	Anhedral.	Equant to subophitic.
Opaque minerals	2.8	2.8	0.03-0.10		Equant, euhedral, skeletal.	Magnetite is partially altered to titanite.
Cryptocrystalline ?		4.2	?	?		Interstitial.
SECONDARY MINERALOGY						
Chlorite	PERCENT 7.0	REPLACING/FILLING Olivine, plagioclase.				COMMENTS Replaced by chlorite, magnetite, pyrite +/-chalcopyrite.
Albite	0.2	Plagioclase.				
Actinolite	0.6	Clinopyroxene.				
Quartz	0.2	Olivine.				
Magnetite	Tr	Olivine.				In altered olivine with chlorite.
Pyrite	Tr	Interstitial.				Inclusions in plagioclase, interstitial to chlorite and actinolite.
Chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase, interstitial to chlorite and actinolite.

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase phenocrysts form 1) mild oscillatory zoned crystals with a sharp transition to a normally zoned rim, 2) subhedral grains with rounded, unzoned cores with glass inclusions and oscillatory zoning in mantle, 3) euhedral core with anhedral rim. Plagioclase, plagioclase+augite, and plagioclase+olivine clots are present.

140-504B-221R-01 (Piece 4,11-15 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 254.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	Tr	0.67-1.91		Equant, euhedral.	Highly altered, difficult to identify.
Plagioclase	Tr	Tr	1.25-2.03		Euhedral, subhedral.	Seriate porphyritic, no clear distinction between phenocrysts and groundmass.
Spinel	Tr	Tr	0.04		Subhedral.	Chrome spinel.
GROUNDMASS						
Plagioclase	20.2	51.4	0.52-3.97		Thick laths.	Subhedral, acicular, and branching crystals.
Clinopyroxene	17.6	44.4	0.98-3.48		Anhedral.	Ophitic to poikilitic, extensively altered.
Opaque minerals	0.4	4.2	0.17-0.58		Equant, skeletal.	Partially altered to titanite, ilmenite in small veinlets.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	3.0	Plagioclase, clinopyroxene, olivine.				Interstitial.
Albite	18.2	Plagioclase.				
Actinolite	39.8	Clinopyroxene, olivine.				
Pyrite	Tr	Vein.				Vein (2-150 microns).
Chalcopyrite	Tr	Vein.				Vein (2-20 microns).
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vein	?	?	?	Chlorite, prehnite.	?	10-micron sized vein.
Vein	?	?	?	See comments.	?	Vein (100-300 microns) of epidote, pyrite chalcopyrite parallel to the chilled contact.

COMMENTS: Augite oikocrysts include plagioclase, rare-primary-textured Fe-Ti oxide minerals, and some small pockets of anhedral plagioclase+ secondary-textured Fe-Ti oxide minerals. Attached chill zone contains plagioclase and augite microphenocrysts in a cryptocrystalline groundmass.

140-504B-221R-01 (Piece 10, 40-44 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 254.

ROCK NAME: Moderately clinopyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.73-1.60		Equant, euhedral.	Completely altered.
Plagioclase	2.2	2.2	0.87-2.44		Subhedral.	Seriate porphyritic.
Clinopyroxene	3.8	3.4	1.16-2.76		Anhedral prisms.	Poikilitic.
GROUNDMASS						
Plagioclase	31.2	51.6	0.80-2.64		Thick laths, blades.	Some acicular and skeletal crystals.
Clinopyroxene	19.6	39.8	0.38-2.20		Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.4	2.0	0.12-0.75		Equant, skeletal.	Magnetite is altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.6	Olivine, plagioclase.				Intergrown with actinolite.
Albite	14.0	Plagioclase.				
Epidote	Tr	Plagioclase.				
Actinolite	22.0	Olivine, clinopyroxene.				Intergrown with chlorite, interstitial.
Magnetite	Tr	Clinopyroxene.				In actinolite.
Anhydrite	0.2	Plagioclase.				
Chalcopyrite	Tr	Interstitial.				Inclusions in plagioclase (10 microns).
VESICLES/ CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	?	?	Actinolite	?	Several 10-100 micron actinolite veinlets.

COMMENTS: Plagioclase forms 1) phenocrysts with uniform cores with rounded and narrow 20-micron rims; 2) equant phenocrysts with (0.1x0.1 mm) polyhedral core and anhedral overgrowths; 3) concentrically zoned grains.

SITE 504

140-504B-222R-01 (Piece 1A, 0-4 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 254.

ROCK NAME: Contact between moderately plagioclase-olivine-clinopyroxene phyric basalt and aphyric diabase

GRAIN SIZE: Fine-grained/medium-grained.

TEXTURE: Porphyritic with cryptocrystalline groundmass/poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	0.8	0.23-2.18		Equant, subhedral.	Completely altered.
GROUNDMASS						
Plagioclase	37.0	51.7	0.38-3.00		Thick laths to blades.	Elongate crystals.
Clinopyroxene	10.8	42.0	0.26-3.00	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	1.4	3.8	0.07-0.28		Equant, euhedral.	Partly altered to titanite.
SECONDARY MINERALOGY						
Chlorite	12.4	REPLACING/FILLING ?				COMMENTS Interstitial with quartz and actinolite in diabase. Partly replacing plagioclase and completely replacing olivine in chilled margin. Also present in vein with quartz.
Albite	9.2	Plagioclase.				In diabase.
Actinolite	29.6	Interstitial, clinopyroxene.				In diabase and in vein.
Quartz	0.6	Olivine.				In the chilled margin with chlorite and hematite.
Hematite	Tr	Olivine.				In chilled margin with chlorite and quartz.
Pyrite	Tr	Olivine.				Replaced by actinolite.
Magnetite	Tr	Clinopyroxene.				Fine-grained in matrix actinolite.
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

COMMENTS: Point counts refer to the diabase. The diabase contains 1) one vein with dirty brownish amphibole at selvages, and chlorite and quartz in the center; 2) one vein with minor chlorite at the edge, and quartz in the center. Trace epidote is locally along the contact with the chilled margin. The coarser diabase is described above. The finer chilled margin contains euhedral to subhedral phenocrysts of plagioclase, olivine (completely altered to chlorite), and augite. The plagioclase has unzoned or slightly oscillatory zoned cores and oval glass inclusions. The augite is ophitic with rounded plagioclase inclusions. Some glomeroporphyritic clots are present.

140-504B-222R-01 (Piece 1E, 17-19 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 254.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic to ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	Tr	?		?	Completely altered, not identifiable.
Plagioclase	Tr	Tr	1.06-2.42		Subhedral.	Seriate porphyritic, no clear distinction between phenocrysts and groundmass.
Clinopyroxene	?	?	0.81-2.38	Augite.	Anhedral prisms.	Seriate porphyritic.
GROUNDMASS						
Plagioclase	40.2	52.0	0.78-3.10		Thick laths, blades.	Subhedral to slightly skeletal, weakly zoned.
Clinopyroxene	22.2	44.5	0.32-1.91	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	3.0	2.2	0.07-0.28		Equant, skeletal.	Magnetite partially altered to titanite.
Interstitial	?	1.3	?		?	
SECONDARY MINERALOGY						
Chlorite	7.8	REPLACING/FILLING Olivine.				COMMENTS Interstitial.
Albite	9.4	Plagioclase.				
Epidote	Tr	Plagioclase.				
Actinolite	17.4	Clinopyroxene, olivine.				Interstitial.
Magnetite	Tr	Olivine.				Associated with chlorite in olivine and amphibole.
Pyrite	Tr	Interstitial.				Interstitial to chlorite, actinolite alteration.
Anhydrite	Tr	Plagioclase.				
VESICLES/CAVITIES						
Vesicles	0	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS None.

140-504B-222R-01 (Piece 6, 37-39 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 254.

ROCK NAME: Moderately clinopyroxene-plagioclase-olivine phyrlic diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.4	0.46-2.06		?	Altered to chlorite.
Plagioclase	0.8	1.8	1.02-2.12		Subhedral.	Seriate porphyritic.
Clinopyroxene	1.0	3.2	1.60-2.52	Augite.	Anhedral prisms.	Seriate porphyritic, ophitic to poikilitic.
Spinel	Tr	Tr	0.04-0.06		Anhedral.	Reddish-brown crystals in alteration patches and in groundmass plagioclase.
GROUNDMASS						
Plagioclase	36.0	48.2	0.78-1.94		Blades.	Elongate, subhedral to branching crystals.
Clinopyroxene	21.4	41.8	0.61-1.80	Augite.	Anhedral.	Ophitic to poikilitic.
Opaque minerals	2.0	3.6	0.12-0.41		Equant, skeletal.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	10.0	Olivine, clinopyroxene, plagioclase.				Interstitial.
Albite	10.2	Plagioclase.				
Actinolite	18.6	Clinopyroxene, olivine.				Interstitial.
Pyrite	Tr	Interstitial.				(20 microns).
Chalcopyrite	Tr	Interstitial.				(2-micron) inclusions in plagioclase.
Magnetite	Tr	Clinopyroxene.				In actinolite as fine dust.
Anhydrite	Tr	Plagioclase.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	?	?	See comments.	?	Numerous parallel chlorite veins. Actinolite, chlorite, quartz (+minor titanite) veinlet. One actinolite veinlet. Alteration halos are absent.

COMMENTS: Some plagioclase+augite segregations contain pockets of trapped residual liquid. Plagioclase forms 1) rare zoned phenocrysts with rounded uniform core and subhedral rim, 2) unzoned groundmass, and 3) rare phenocrysts with oscillatory zoning.

140-504B-222R-01 (Piece 19, 100-104 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 255.

ROCK NAME: Moderately clinopyroxene-plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	0.6	0.75-1.68		Equant, euhedral.	Altered to actinolite and chlorite.
Plagioclase	1.0	1.0	0.84-2.32		Euhedral to subhedral.	Faintly zoned.
Clinopyroxene	1.4	1.4	0.77-1.74	Augite.	Subhedral prisms.	Most are inclusion-free, some zoned.
GROUNDMASS						
Plagioclase	42.6	50.8	0.26-0.71		Laths.	Anhedral zoned crystals and subhedral unzoned laths.
Clinopyroxene	17.4	41.0	0.09-0.18		Anhedral, granular.	Subophitic.
Opaque minerals	2.8	5.2	0.04-0.12		Equant to skeletal.	Partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	4.6	Olivine, interstitial.				
Albite	4.2	Plagioclase.				
Epidote	Tr	Plagioclase.				
Quartz	Tr	Olivine.				
Prehnite	Tr	Plagioclase.				
Anhydrite	Tr	Plagioclase.				
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase-olivine glomerocrysts with normally-zoned plagioclase, and plagioclase-augite glomerocrysts with subhedral to anhedral plagioclase and altered glass inclusions. A 0.1-mm actinolite vein, without associated alteration halo, crosscut by 10-micron chlorite veins, in turn crosscut and offset by a later actinolite vein (50 microns wide).

SITE 504

140-504B-222R-01 (Piece 24,129-132 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 256.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Spinel	Tr	Tr	0.02-0.20		Anhedra.	Black to reddish-brown inclusions in plagioclase and in the groundmass.
GROUNDMASS						
Plagioclase	29.4	52.2	0.78-2.09		Thick laths.	Unzoned to slightly zoned elongate crystals.
Clinopyroxene	2.0	43.8	0.41-2.32	Augite.	Anhedra.	Ophitic.
Opaque minerals	2.2	3.2	0.09-0.46		Equant, skeletal.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	5.6	Olivine.				Interstitial.
Albite	19.8	Plagioclase.				Veins.
Epidote	Tr	Plagioclase.				
Actinolite	40.8	Clinopyroxene.				Interstitial, vein.
Titanite	?	Titanomagnetite.				Interstitial.
Prehnite	0.2	Plagioclase.				With albite in veins.
Chalcopyrite	Tr	?				Included in plagioclase (only 2 grains).
Magnetite	Tr	?				As inclusions in actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veins	?	?	?	See comments.	?	None.

COMMENTS: Very few sulfide minerals. Several thin albite+prehnite and quartz+prehnite+chlorite veins (0.2-0.6 mm) are present. One crosscuts a dirty-brown fine-grained actinolite vein.

140-504B-223R-01 (Piece 6, 20-23 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 258.

ROCK NAME: Moderately plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	2.0	0.17-1.10		Subhedral.	Completely altered.
Plagioclase	6.0	3.8	0.91-2.38		Subhedral to anhedral.	A variety of textures.
Clinopyroxene	0.8	1.8	1.28-2.09	Augite.	Anhedral prisms.	Poikilitic to ophitic. Most have inclusion-free cores with ophitic rims. Some zoned crystals.
GROUNDMASS						
Plagioclase	48.2	48.2	0.44-1.23		Thin-thick laths.	
Clinopyroxene	36.0	40.8	0.44-1.33	Augite.	Anhedral to subhedral.	Granular to subophitic.
Opaque minerals	2.6	3.4	0.16-0.24		Equant to skeletal.	Magnetite is partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	2.8	Olivine.				Associated with quartz and magnetite, plagioclase.
Albite	1.0	Plagioclase.				
Titanite	Tr	Titanomagnetite.				
Quartz	Tr	Olivine.				
Magnetite	Tr	Actinolite.				
Actinolite	2.6	Clinopyroxene, interstitial.				
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Pyrite is associated with chlorite, mixed-layer chlorite-smectite, up to 400 microns. Pyrite+chalcopyrite included in plagioclase.

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

COMMENTS: Plagioclase forms (1) phenocrysts greater than 1 mm with numerous glass inclusions aligned parallel to twin planes in the rounded core, with a 50-micron-wide rim; (2) oscillatory zoned phenocryst with no glass inclusions; (3) clots of plagioclase with weak oscillatory zoning in the core, stronger oscillations in the mantle, and gradational zoning in the rim. Some 2- to 3-mm patches of fine-grained groundmass.

SITE 504

140-504B-224R-01 (Piece 4, 21-24 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 258.

ROCK NAME: Moderately plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	0.4	0.13-1.31		Equant, subhedral.	Completely altered.
Plagioclase	6.6	5.8	0.84-2.78		Subhedral.	
Clinopyroxene	0.4	0.8	0.96-1.31	Augite.	Subhedral to anhedral.	Ophitic to poikilitic, weak zoning.
Spinel	Tr	Tr	0.08		Euhedral.	More yellow than magnetite, possibly Fe-rich spinel in groundmass.
GROUNDMASS						
Plagioclase	50.6	50.4	0.40-1.10		Thin laths.	Subhedral to skeletal.
Clinopyroxene	35.8	40.2	0.26-0.41	Augite.	Anhedral, granular.	Ophitic.
Opaque minerals	3.0	3.2	0.06-0.29		Equant, skeletal.	Not much alteration to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	2.0	Olivine.				Mixed-layer chlorite-smectite and quartz.
Chlorite	0.8	Olivine, interstitial.				Associated with quartz.
Albite	0.6	Plagioclase.				
Actinolite	2.2	Clinopyroxene, interstitial.				
Quartz	Tr	Olivine.				Associated with chlorite and with mixed-layer chlorite and smectite.
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Associated in olivine with chlorite, quartz and mixed-layer chlorite-smectite.
Titanite	Tr	Interstitial.				Inclusions in plagioclase. Associated with chlorite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Anorthositic and proto-gabbroic crystal clots contain poikilitic augite and plagioclase. Plagioclase: 1) Clot grains with euhedral, unzoned core with numerous 5-micron glass inclusions arranged in three concentric bands, a euhedral oscillatory zoned mantle that is free of glass inclusions and a subhedral rim. Smaller grains in clot have similar zoning but no glass inclusions; 2) Phenocrysts with concentric oscillatory zoning appears to correspond to the mantle of large grains in clot; 3) Subhedral phenocryst with round core and few oscillations between core and rim.

140-504B-224R-01 (Piece 14,59-62 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 258.

ROCK NAME: Sparsely plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.0	Tr	0.41-0.52		?	Totally altered.
Plagioclase	1.4	0.8	0.73-1.33		Subhedral.	Variety of zoning patterns.
Clinopyroxene	1.4	0.6	0.73-1.16	Augite.	Euhedral to subhedral.	Inclusion-poor, some with rounded plagioclase inclusions.
Spinel	Tr	Tr	0.02		Anhedral.	Reddish-yellow inclusion in core of plagioclase clots.
GROUNDMASS						
Plagioclase	48.6	58.8	0.60-1.10		Elongate laths.	Subhedral to skeletal.
Clinopyroxene	8.0	37.0	0.16-0.40	Augite.	Anhedral.	Subophitic to ophitic.
Opaque minerals	3.2	2.8	0.08-0.18		Equant to skeletal.	Partly altered to titanite.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Albite	0.4	Plagioclase.	
Epidote	Tr	Interstitial.	
Actinolite	37.0	Clinopyroxene, interstitial.	
Magnetite	Tr	Clinopyroxene.	In actinolite.
Pyrite	Tr	Interstitial, silicates.	Up to 50 microns.
Chalcopyrite	Tr	Interstitial.	Inclusions in plagioclase, 2-20 microns.

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Several actinolite veins (0.05-0.1 mm), with associated alteration halo (0.04 to 0.20 mm) where partly altered plagioclase "swim" in an actinolite "bath", with altered pyroxene, titanomagnetite, and olivine. Anorthositic proto-clots and proto-gabbroic clots occasionally contain pockets (trapped liquid?) with significant amount of primary-textured Fe-Ti-oxide. Plagioclase phenocrysts are grouped into three types: 1) those with broad, uniform, core, mantle, and rim; 2) those with elongate glass inclusions in a uniform core, followed by an oscillatory rim; 3) grains that are similar to those in type 2 but without glass inclusions. Glomerocrysts contain unzoned grains and grains zoned like phenocrysts.

140-504B-225R-01 (Piece 10, 40-44 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 259.

ROCK NAME: Aphyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Aphanitic microcrystalline.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.2	0.2	0.44-0.90		Anhedral.	Zoned.
Spinel	Tr	Tr	0.02		Euhedral to subhedral.	Reddish-brown to reddish-yellow, inclusions in plagioclase with wavy extinction.
GROUNDMASS						
Plagioclase	34.8	51.8	0.29-1.16		Laths.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	11.0	44.6	0.49-0.93	Augite.	Anhedral.	Subophitic to poikilitic.
Opaque minerals	2.4	3.4	0.06-0.20		Equant, subhedral.	Extensively altered to titanite.

SECONDARY MINERALOGY	PERCENT	REPLACING/FILLING	COMMENTS
Albite	5.4	Plagioclase.	
Actinolite	46.2	Clinopyroxene, interstitial.	
Chalcopyrite	Tr	Interstitial, altered clinopyroxene.	
Pyrite	Tr	Interstitial.	
Magnetite	Tr	Clinopyroxene.	Associated with actinolite.

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Several actinolite and minor chlorite veins (40-80 micron) are present. Plagioclase forms two types of phenocrysts: 1) equant with oscillatory zoned mantle over rounded core; 2) subhedral with wavy extinction. Grains in glomerocrysts have zoning similar to 1.

SITE 504

140-504B-225R-01 (Piece 14, 59-61 cm)

OBSERVER: SBP WHERE SAMPLED: Unit 259.

ROCK NAME: Sparsely olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.20-1.07		Unknown.	Altered to actinolite.
Plagioclase	0.2	0.6	0.58-1.31		Subhedral.	
Spinel	Tr	Tr	0.01		?	Numerous reddish-brown to reddish-yellow grains in groundmass or inclusions in plagioclase or augite.
GROUNDMASS						
Plagioclase	39.8	52.6	0.26-1.13		Anhedral laths.	Subhedral to acicular.
Clinopyroxene	4.2	43.2	0.38-1.80	Augite.	Anhedral.	Altered to actinolite, ophitic to poikilitic.
Opaque minerals	1.0	2.6	0.07-0.20		Equant to skeletal.	Magnetite is partly replaced by titanite (80%). Exsolution lamellae of ilmenite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	4.0	Plagioclase.				
Actinolite	50.8	Clinopyroxene, interstitial, olivine.				
Titanite	Tr	Magnetite.				Associated with actinolite.
Magnetite	Tr	Clinopyroxene.				Fine grains in actinolite.
Pyrite+ chalcopyrite	Tr	Interstitial.				With actinolite.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Actinolite vein (0.3 mm) is not included in point count. Plagioclase phenocrysts fall into two groups: 1) euhedral with polyhedral oscillatory zoned core containing pre-formed plagioclase grains; 2) grains similar to 1 but with a 20-micron reversely zoned mantle; 3) grains with a euhedral core surrounded with a band of glass inclusions.

140-504B-225R-01 (Piece 34, 137-139 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	1.8	0.46-1.48		Equant, anhedral.	Partly altered to talc.
Plagioclase	2.4	2.4	0.75-1.45		Subhedral.	Uniform and oscillatory cores.
Spinel	Tr	Tr	0.75-1.45		?	Reddish to reddish-yellow inclusions in plagioclase cores.
GROUNDMASS						
Plagioclase	49.4	53.0	0.46-1.45		Laths.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	33.2	40.4	0.17-0.93	Augite.	Anhedral.	Equant inclusion-free and poikilitic crystals.
Opaque minerals	3.8	2.4	0.06-0.29		Equant, skeletal.	Magnetite, no exsolution lamellae (up to 350 microns).
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	0.2	Olivine.				Talc-smectite.
Clays	Tr	Olivine.		Serpentine.		
Chlorite	0.8	Interstitial.				
Actinolite	6.0	Clinopyroxene, interstitial.				
Talc	4.4	Olivine.				
Hematite+ magnetite	Tr	Olivine.				
Pyrite+ chalcopyrite	Tr	Olivine, interstitial.				Also pyrite as inclusions in plagioclase (up to 250 microns).
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Abundant sulfide minerals. Anorthositic proto-clots with minor augite. Some contain pockets of Fe-Ti-oxide-poor trapped liquid. Clots contain oscillatory zoned plagioclase with rare glass inclusions.

SITE 504

140-504B-225R-02 (Piece 7,42-44 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Moderately olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	1.0	2.2	0.64-1.42		Equant, anhedral.	Poikilitic, partially altered to talc and serpentine.
Plagioclase	1.0	1.0	1.01-2.44		Subhedral, euhedral.	Euhedral core with wavy extinction and a normally zoned rim.
GROUNDMASS						
Plagioclase	53.6	52.2	0.58-1.51		Thick laths.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	39.8	42.2	0.35-1.19	Augite.	Anhedral.	Poikilitic.
Opaque minerals	1.8	2.4	0.04-0.42		Equant, subhedral.	Magnetite is partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	Tr	Olivine.				Serpentine.
Clay minerals	Tr	Olivine.				Smectite.
Chlorite	0.2	Interstitial.				
Actinolite	11.0	Clinopyroxene.				Interstitial.
Talc	1.0	Olivine.				
Magnetite	Tr	Olivine.				Associated with talc.
Pyrite+ chalcocopyrite	Tr	Interstitial.				In altered olivine, included in plagioclase.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Veinlet	?	?	>0.04-0.02	Chlorite.	?	Thin (4-20 micron) parallel chlorite veinlets cut the section through the center.

COMMENTS: Some plagioclase oikocrysts are slightly resorbed with pockets of relatively evolved liquid containing 30% opaque oxide minerals.

140-504B-226R-01 (Piece 3,16-20 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Highly plagioclase-olivine-clinopyroxene phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0.2	7.0	0.73-1.77		Equant, anhedral.	20%-100% altered to talc and serpentine.
Plagioclase	6.6	6.6	1.13-2.61		Euhedral, subhedral.	Uniform cores with zoned rims.
Clinopyroxene	2.4	3.6	0.78-2.18	Augite.	Subhedral, anhedral.	Poikilitic, veriate porphyritic.
Spinel	Tr	Tr	0.03-0.08		Rounded, subhedral.	Inclusions in olivine and plagioclase.
GROUNDMASS						
Plagioclase	48.8	44.8	0.67-2.11		Thick laths, blades.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	22.0	35.6	0.49-1.07	Augite.	Anhedral.	Poikilitic.
Opaque minerals	2.2	2.4	0.10-0.23		Equant, skeletal.	Magnetite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	3.0	Olivine.				Serpentine.
Chlorite	1.0	Interstitial.				
Actinolite	15.0	Clinopyroxene.				Interstitial.
Talc	1.8	Olivine.				
Magnetite	Tr	Olivine.				Associated with talc and serpentine.
Pyrite+ chalcocopyrite	Tr	Olivine.				Interstitally and as inclusions in plagioclase.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase forms phenocrysts with uniform cores, either with numerous (100-micron) glass inclusions, or free of glass inclusions, or with plagioclase inclusions. Plagioclase clots are made up of unzoned grains. Olivine contains reddish-yellow (predominant) and reddish-brown spinels and rare rounded plagioclase inclusions.

140-504B-226R-01 (Piece 12,61-63 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	0.6	0.61-2.12		Equant, anhedral.	Completely altered to chlorite.
Plagioclase	8.0	8.0	1.07-2.26		Euhedral, subhedral.	
Clinopyroxene	5.4	5.4	0.81-1.28	Augite.	Anhedral.	Poikilitic, seriate porphyritic.
Spinel	Tr	Tr	0.2-0.20		Anhedral.	As inclusions in olivine and plagioclase.
GROUNDMASS						
Plagioclase	43.0	49.0	0.64-1.53		Thick laths, blades.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	13.4	35.2	0.55-2.84	Augite.	Anhedral.	Poikilitic.
Opaque minerals	2.0	1.8	0.08-0.30		Equant, skeletal.	Extensively altered to titanite, exsolution lamellae.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	6.8	Olivine.				Interstitial.
Albite	1.2	Plagioclase.				
Epidote	Tr	Clinopyroxene.				
Actinolite	20.2	Clinopyroxene.				Interstitial.
Titanite	Tr	Titanomagnetite.				Interstitial.
Laumontite	Tr	?				In the center of an alteration patch rimmed by chlorite and minor titanite.
Magnetite	?	Clinopyroxene.				Fine-grained in actinolite.
Pyrite	?	Olivine.				A few anhedral grains in chlorite after olivine.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: The section contains very few sulfide minerals. Several proto-gabbroic crystal clots include trapped pockets of residual evolved magma, crystallized into Fe-Ti oxide minerals (30%-50% of the pocket), altered pyroxene (chlorite), and plagioclase. Plagioclase forms 1) phenocrysts with numerous (5-micron) glass inclusions and an inclusion-free mantle, 2) zoned mantle similar to 1 with 20-micron reddish-yellow spinel, and 3) phenocrysts with broad oscillatory zoning. Spinel forms 1) corroded reddish-yellow (60-micron) grain in core of altered olivine, 2) round (20-micron) reddish-yellow grain in core of plagioclase phenocryst, and 3) reddish-brown (200-micron) interior and black, corroded, symplectic exterior is part of plagioclase-augite clot.

SITE 504

140-504B-226R-02 (Piece 10, 77-79 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Highly clinopyroxene-plagioclase-olivine-phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	3.0	0.58-1.35		Equant, anhedral.	Altered to phyllosilicates, poikilitic.
Plagioclase	5.4	5.4	0.93-2.67		Euhedral, subhedral.	Uniform cores with oscillatory zoned rims.
Clinopyroxene	8.0	8.6	1.19-2.06	Augite.	Anhedral, subhedral.	Poikilitic, seriate porphyritic.
Spinel	Tr	Tr	0.04		Anhedral.	Reddish-brown inclusions in plagioclase.
GROUNDMASS						
Plagioclase	48.0	54.2	0.52-2.51		Thick laths, blades.	Subhedral, skeletal.
Clinopyroxene	18.2	26.8	0.28-2.61	Augite.	Anhedral.	Poikilitic.
Opaque minerals	2.6	2.0	0.06-0.32		Equant, skeletal.	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	2.0	Olivine.				Smectite.
Chlorite	2.2	Olivine, plagioclase.				
Albite	0.2	Plagioclase.				
Actinolite	12.2	Clinopyroxene.				Interstitial, locally bluish-green.
Talc	3.2	Olivine.				Interstitial, associated with actinolite.
Hematite	Tr	Olivine.				Associated with smectite.
Magnetite	Tr	Olivine.				In talc.
Pyrite+ chalcopyrite	Tr	Olivine, silicate minerals.				Associated with smectite, talc, magnetite, and as inclusions in plagioclase.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Some gabbroic proto-clots contain completely altered olivine grains. Trapped residual liquid pockets are common with opaque phases approaching 20%-25% of the pocket volume.

140-504B-227R-01 (Piece 10, 83-85 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Highly clinopyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.8	0.84-2.38		Equant, anhedral.	Partially altered to talc and chlorite, poikilitic.
Plagioclase	6.4	6.4	1.19-2.38		Euhedral, subhedral.	Unzoned cores, oscillatory zoned rims.
Clinopyroxene	7.0	7.0	1.60-2.32	Augite.	Anhedral.	Poikilitic, seriate porphyritic.
Spinel	Tr	Tr	0.03-0.07		Euhedral, skeletal.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	44.8	45.2	0.49-2.55		Thick laths.	Subhedral to skeletal.
Clinopyroxene	20.4	33.2	0.38-2.52	Augite.	Anhedral.	Poikilitic.
Opaque minerals	1.6	5.0	0.07-0.32		Equant, skeletal.	
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	3.0	Olivine.				Smectite.
Chlorite	8.4	Olivine, plagioclase.				Interstitial.
Albite	0.2	Plagioclase.				
Actinolite	9.0	Clinopyroxene.				
Quartz	0.4	Olivine.				In the core of altered olivine phenocrysts.
Talc	1.9	Olivine.				
Magnetite	Tr	Olivine.				
Hematite	Tr	Olivine.				In quartz replacing olivine.
Pyrite+ chalcocpyrite	Tr	Interstitial.				Chalcocpyrite and pyrite inclusions in plagioclase, in olivine pseudomorphs.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Proto-gabbroic crystal clots contain some primary-textured magnetite. Augite is poikilitic in these clots and includes small Fe-Ti oxide grains as well as plagioclase. Some of the clots are rich in primary Fe-Ti oxide minerals, approaching Fe-Ti gabbro compositions. Spinel occurs as 1) euhedral reddish-yellow (30-micron) inclusions in plagioclase, 2) reddish-yellow (50-micron) grain with plagioclase grain in glomerocryst, and 3) as corroded (70-micron) black anhedral grain in mantle of 0.5-mm plagioclase grain.

SITE 504

140-504B-227R-02 (Piece 1, 0-5 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Highly clinopyroxene-plagioclase-olivine phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.8	0.78-1.97		Equant, subhedral.	Altered to chlorite and quartz.
Plagioclase	7.0	7.0	1.31-2.90		Subhedral to anhedral.	
Clinopyroxene	12.0	12.0	0.17-2.90	Augite.	Anhedral.	Poikilitic, seriate porphyritic.
Spinel	Tr	Tr	0.06-0.07		Anhedral.	Inclusions in plagioclase.
GROUNDMASS						
Plagioclase	44.4	50.0	0.84-2.81		Thick laths to blades.	Subhedral to skeletal crystals.
Clinopyroxene	11.6	24.8	0.55-2.03	Augite.	Anhedral.	Poikilitic.
Opaque minerals	2.4	3.4	0.15-0.38		Equant to subhedral.	Partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Chlorite	8.4	Olivine, plagioclase.				
Albite	0.8	Plagioclase.				
Actinolite	12.2	Clinopyroxene.				
Quartz	1.2	Olivine.				
Hematite	Tr	Olivine.				
Magnetite	Tr	Olivine.				
Pyrite	Tr	Olivine.				
Anhydrite	Tr	Olivine.				Replaces chlorite in olivine.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Chlorite is intergrown with or is replaced by minor anhydrite. Plagioclase forms phenocrysts with round or euhedral cores and glass inclusions less than 50 microns. Plagioclase clots are free of glass inclusions and are not zoned. Spinel occurs as 70-micron reddish-yellow anhedral grain in cores of plagioclase, as a corroded, reddish-brown, altered round grain on rim, and as a 60-micron grain in plagioclase clot.

140-504B-227R-02 (Piece 2, 14-16 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 260.

ROCK NAME: Moderate plagioclase-clinopyroxene phyric diabase

GRAIN SIZE: Medium-grained.

TEXTURE: Subophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	3.2	4.0	1.36-3.19		Euhedral to subhedral.	Partly altered, zoned with homogenous core and sharp rims.
Clinopyroxene	0	3.0	2.32-6.53		Subhedral to anhedral.	Completely altered.
Spinel	Tr	Tr	0.04-0.15		Anhedral.	
GROUNDMASS						
Plagioclase	3.4	50.0	0.44-1.97		Thick laths to blades.	Altered to albite.
Clinopyroxene	0	40.0	0.96-2.18		Anhedral.	Altered to actinolite.
Opaque minerals	1.4	3.0	0.15-0.70		Equant, euhedral.	Extensively altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Albite	16.4	Plagioclase.				
Epidote	16.0	Plagioclase, amygdules.				
Actinolite	59.4	Clinopyroxene, amygdules.				
Anhydrite	0.2	Plagioclase.				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	20	?	4-5	Actinolite, epidote.	Irregular.	Amygdules.

COMMENTS: Due to extensive alteration, primary mode is approximate. No sulfide minerals were observed. Amygdules were included in point count. One reddish-brown, symplectitic spinel grain in plagioclase (0.04 mm) and 1 grain with black corroded rim in groundmass (0.15 mm).

140-504B-228R-01 (Piece 13,55-57 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 262.

ROCK NAME: Moderately plagioclase-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic to poikilitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.0	0.78-1.62		Equant, subhedral.	Altered to talc.
Plagioclase	5.0	5.0	0.84-2.87		Subhedral.	
GROUNDMASS						
Plagioclase	45.6	50.0	0.46-1.57		Laths to skeletal.	Subhedral, skeletal, and branching crystals.
Clinopyroxene	30.8	42.0	0.15-0.87	Augite.	Anhedral.	
Opaque minerals	2.0	1.6	0.05-0.30		Equant to skeletal.	
Olivine	0	0.4	0.23-0.35		Equant, subhedral.	Altered to talc.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	4.0	Olivine.				Serpentine(?) and hematite.
Clays	Tr	Olivine.				Mixed-layer.
Chlorite	0.8	Plagioclase, interstitial.				
Actinolite	13.2	Clinopyroxene, interstitial.				
Talc	2.6	Olivine.				Associated with magnetite.
Magnetite	Tr	Olivine.				With talc and mixed-layer and includes pyrite.
Pyrite+ chalcocopyrite	Tr	Olivine, interstitial.				Associated with actinolite-chlorite.

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Two types of plagioclase zoning was observed in both phenocrysts and clots: 1) uniform, euhedral cores with a sharp transition to subhedral rim (50- to 100-micron wide); 2) oscillatory zoned, euhedral core.

140-504B-229R-01 (Piece 3, 7-11 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 263.

ROCK NAME: Highly plagioclase-clinopyroxene-olivine phyrlic diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Glomeroporphyritic with ophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.2	0.10-1.36		Equant, subhedral.	Altered to actinolite.
Plagioclase	9.2	7.0	0.52-1.57		Subhedral.	
Clinopyroxene	3.0	6.2	1.10-5.31	Augite.	Subhedral prisms.	Inclusion-free to slightly ophitic rim.
GROUNDMASS						
Plagioclase	45.6	45.0	0.17-0.42		Laths.	Subhedral to acicular.
Clinopyroxene	36.6	35.4	0.09-0.16	Augite.	Anhedral.	Subhedral, ophitic, poikilitic.
Opaque minerals	3.0	5.2	0.06-0.16		Equant to subhedral.	Partly altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clays	Tr	Olivine.				Mixed-layer chlorite-chlorite.
Chlorite	2.0	Interstitial, olivine.				
Albite	2.8	Plagioclase.				
Actinolite	1.0	Clinopyroxene.				
Quartz	0.6	Olivine.				
Pyrite	Tr	Interstitial, silicates.				

VESICLES/ CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase and augite crystal clots are present. Plagioclase phenocrysts contain numerous glass inclusions in uniform euhedral cores surrounded by oscillatory zoned mantle. Clots contain plagioclase with several textures. Both euhedral and rounded cores and rounded and euhedral mantles. Some clots have unzoned plagioclase that are aligned.

SITE 504

140-504B-229R-01 (Piece 10,34-37 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 265.

ROCK NAME: Moderately olivine-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with subophitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	1.8	0.64-1.16		?	Extensively altered to actinolite.
Plagioclase	4.4	0.8	0.78-2.03		Subhedral.	
Spinel	Tr	Tr	0.05		?	Reddish-brown inclusions in mantle and rim of plagioclase phenocrysts.
GROUNDMASS						
Plagioclase	42.0	54.6	0.49-1.39		Thick laths, blades.	Subhedral to skeletal.
Clinopyroxene	5.2	39.4	0.20-0.73		Anhedral.	Subophitic to ophitic, mostly altered.
Opaque minerals	2.0	3.4	0.06-0.19		Equant, skeletal.	Most grains are altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Albite	2.8	Plagioclase.				Interstitial, dirty appearance.
Actinolite	43.4	Clinopyroxene, olivine.				

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: No sulfide minerals. Plagioclase forms a clot of grains greater than 0.5 mm with unzoned euhedral cores, a thin mantle, and black subhedral spinel grains. Phenocrysts have euhedral, uniform cores, and oscillatory zoned mantles. Unzoned grains commonly contain plagioclase inclusions.

140-504B-233R-01 (Piece 2, 4-7 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 266.

ROCK NAME: Sparsely clinopyroxene-plagioclase phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic, microcrystalline groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Plagioclase	0.5	0.6	0.44-1.58		Subhedral, euhedral.	Cores are unzoned and euhedral.
Clinopyroxene	0.6	0.8	0.32-0.84		Subhedral.	Partially altered to actinolite.
GROUNDMASS						
Plagioclase	37.9	52.2	0.23-0.93		Laths.	Subhedral to skeletal.
Clinopyroxene	0.8	42.4	0.12-0.20		Anhedral.	Altered to actinolite, subhedral to subophitic.
Opaque minerals	1.6	4.0	0.04-0.20		Equant, skeletal.	Magnetite is altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/FILLING				COMMENTS
Albite	3.2	Plagioclase.				
Actinolite	55.4	Clinopyroxene, plagioclase.				Interstitial.
Magnetite	Tr	Silicate minerals.				Fine-grained in actinolite.

VESICLES/CAVITIES	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: No sulfide minerals.

140-504B-236R-01 (Piece 1, 0-4 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 269.

ROCK NAME: Highly plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Porphyritic with aphanitic groundmass.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	0	2.6	0.90-1.77		Equant, anhedral.	Altered extensively to chlorite.
Plagioclase	10.0	9.4	0.06-2.67		Anhedral.	
GROUNDMASS						
Plagioclase	48.0	48.2	0.35-1.48		Thick laths.	Subhedral to skeletal.
Clinopyroxene	23.2	37.8	0.29-0.84	Augite.	Anhedral.	Ophitic.
Opaque minerals	2.0	2.0	0.06-0.46		Equant, skeletal.	Magnetite is partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	1.0	Olivine.				Smectite.
Chlorite	2.8	Olivine.				Plagioclase.
Actinolite	13.2	Clinopyroxene.				
Talc	0.8	Olivine.				
Magnetite	Tr	Titanomagnetite.				Fine-grained in actinolite.
Pyrite	Tr	Silicate minerals.				Intergrown with chalcopyrite, interstitial.
Chalcopyrite	Tr	Silicate minerals.				Included in pyrite, plagioclase, and interstitial.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Anorthosite clots exhibit "bleeding" plagioclase and trapped residual melt pockets. Plagioclase forms euhedral phenocrysts with 1) rounded core and broad oscillatory zoned mantles (50-100 micron); 2) euhedral, unzoned core with abundant altered glass inclusions, 5-20 microns in diameter, and a mantle free of glass inclusions; and 3) numerous euhedral oscillations. A clot of plagioclase grains contains zoned and unzoned grains with glass inclusions and crystal fragments (200-400 micron).

140-504B-238R-01 (Piece 8, 22-25 cm)

OBSERVER: SBP

WHERE SAMPLED: Unit 269.

ROCK NAME: Moderately plagioclase-olivine phyric diabase

GRAIN SIZE: Fine-grained.

TEXTURE: Ophitic.

PRIMARY MINERALOGY	PERCENT PRESENT	PERCENT ORIGINAL	SIZE (mm)	COMPOSITION	MORPHOLOGY	COMMENTS
PHENOCRYSTS						
Olivine	Tr	1.4	0.20-1.32		Subhedral, equant, anhedral.	Mostly altered to talc, some relict crystals with plagioclase inclusions.
Plagioclase	2.6	1.4	0.73-1.64		Subhedral.	
Spinel	Tr	Tr	0.08		?	Reddish-brown inclusions in plagioclase.
GROUNDMASS						
Plagioclase	51.8	49.2	0.38-1.15		Thin, thick laths.	Subhedral to skeletal, some curved laths.
Clinopyroxene	31.8	45.8	0.17-0.67	Augite.	Anhedral.	Ophitic.
Opaque minerals	2.4	2.2	0.08-0.35		Equant, skeletal.	Partially altered to titanite.
SECONDARY MINERALOGY						
	PERCENT	REPLACING/ FILLING				COMMENTS
Clay minerals	2.0	Olivine.				Serpentine.
Clay minerals	Tr	Olivine.				Mixed-layer chlorite-smectite.
Chlorite	Tr	Interstitial.				With or without actinolite.
Actinolite	10.4	Clinopyroxene.				Interstitial.
Talc	1.0	Olivine.				Interstitial.
Magnetite	Tr	Olivine.				Associated with talc and actinolite.
Pyrite	Tr	Olivine.				Interstitial and as inclusions in plagioclase.
Chalcopyrite	Tr	Olivine.				Interstitial and as inclusions in plagioclase.
VESICLES/CAVITIES						
	PERCENT	LOCATION	SIZE (mm)	FILLING	SHAPE	COMMENTS
Vesicles	0					None.

COMMENTS: Plagioclase phenocrysts with unzoned core with 5- to 50-micron glass inclusions and 80-micron reddish-yellow spinel inclusions surrounded by a round oscillatory mantle exhibiting oscillatory zoning from core to rim. Clots contain unzoned subhedral to euhedral grains.