Appendix D: Laboratory Testing

Moisture Contents

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Material Test Report

Report No: MAT:ANC-W1886-S1

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S1'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/17/2021

Sample Details

Sample ID	ANC-W1886-S1
Field Sample ID	LT-1, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-1, S-1
Depth	3.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	10.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S2
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S2'.

Client: Alaska DOT&PF, Southcoast Region   CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S2
Field Sample ID	LT-1, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-1, S-2
Depth	5.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	15.4	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S3
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S3'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S3
Field Sample ID	LT-1, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-1, S-3
Depth	7.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	5.4	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S4

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S4'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S4
Field Sample ID	LT-1, S-5
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-1, S-5
Depth	12.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	15.9	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S5
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S5'.

Client: Alaska DOT&PF, Southcoast Region   CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S5
Field Sample ID	LT-2, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-1
Depth	3.0-4.5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	17.9	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S6

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S6'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S6
Field Sample ID	LT-2, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-2
Depth	5.0-6.5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	14.8	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S7

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S7'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S7
Field Sample ID	LT-2, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-3
Depth	7.0-8.5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	8.7	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S8

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S8'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S8
Field Sample ID	LT-2, S-4
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-4
Depth	9.5-11.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	11.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S9
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S9'.

Client: Alaska DOT&PF, Southcoast Region
CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S9
Field Sample ID	LT-2, S-5
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-5
Depth	12.0-13.5'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	20.9	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S10
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S10'.

Client: Alaska DOT&PF, Southcoast Region
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Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/17/2021

Sample Details

Sample ID	ANC-W1886-S10
Field Sample ID	LT-2, S-6
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-2, S-6
Depth	17.0-17.9'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	2.1	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S11
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S11'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/17/2021

Sample Details

Sample ID	ANC-W1886-S11
Field Sample ID	LT-3, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-1
Depth	3.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	20.5	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S12
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S12'.

Client: Alaska DOT&PF, Southcoast Region
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Project: DOT_SC Haines Beach Road Landslide

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/17/2021

Sample Details

Sample ID	ANC-W1886-S12
Field Sample ID	LT-3, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-2
Depth	5.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	19.3	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S13

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S13'.

Client: Alaska DOT&PF, Southcoast Region

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Project: DOT_SC Haines Beach Road Landslide

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/17/2021

Sample Details

Sample ID	ANC-W1886-S13
Field Sample ID	LT-3, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-3
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	13.0	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S14
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S14'.

Client: Alaska DOT&PF, Southcoast Region   CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S14
Field Sample ID	LT-3, S-4
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-4
Depth	

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	16.5	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S15

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S15'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S15
Field Sample ID	LT-3, S-5
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-5
Depth	

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	15.2	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S16
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S16'.

Client: Alaska DOT&PF, Southcoast Region
CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S16
Field Sample ID	LT-3, S-6
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-3, S-6
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	6.4	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S17

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S17'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S17
Field Sample ID	LT-4, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-4, S-1
Depth	

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	14.5	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S18
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S18'.

Client: Alaska DOT&PF, Southcoast Region
CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S18
Field Sample ID	LT-4, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-4, S-2
Depth	12.0-13.5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	12.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S19
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S19'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S19
Field Sample ID	LT-5, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-5, S-1
Depth	5.0-6.5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	6.7	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S20

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S20'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S20
Field Sample ID	LT-5, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-5, S-2
Depth	10.0-11.5'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	6.6	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S21
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S21'.

Client: Alaska DOT&PF, Southcoast Region   CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S21
Field Sample ID	LT-5, S-4
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-5, S-4
Depth	21.0-21.5'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	9.4	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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www.rmconsult.com

Material Test Report

Report No: MAT:ANC-W1886-S22
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S22'.

Client: Alaska DOT&PF, Southcoast Region
CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S22
Field Sample ID	LT-6, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-6, S-1
Depth	

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	9.0	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S23
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S23'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S23
Field Sample ID	LT-6, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-6, S-2
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	7.9	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S24

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S24'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S24
Field Sample ID	LT-6, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-6, S-3
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	10.0	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S25

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S25'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S25
Field Sample ID	LT-7, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-7, S-1
Depth	3'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	9.3	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S26

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S26'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S26
Field Sample ID	LT-7, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-7, S-2
Depth	5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	2.5	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S27

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S27'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S27
Field Sample ID	LT-7, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-7, S-3
Depth	7'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	1.7	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S28
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S28'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S28
Field Sample ID	LT-8, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-8, S-1
Depth	3'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	8.6	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S29
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S29'.

Client: Alaska DOT&PF, Southcoast Region   CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S29
Field Sample ID	LT-8, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-8, S-2
Depth	5'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	8.0	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S30

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S30'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S30
Field Sample ID	LT-8, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-8, S-3
Depth	7'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	10.5	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S31
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S31'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S31
Field Sample ID	LT-9, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-9, S-1
Depth	3.0-3.4'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	1.3	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S32
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S32'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S32
Field Sample ID	LT-9, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-9, S-3
Depth	18.5-20.0'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	20.2	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S33

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S33'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S33
Field Sample ID	LT-10, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-10, S-1
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	17.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S34
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S34'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S34
Field Sample ID	LT-10, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-10, S-2
Depth	

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	14.8	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S35

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S35'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S35
Field Sample ID	LT-10, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-10, S-3
Depth	

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	9.9	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S36

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S36'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

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Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S36
Field Sample ID	LT-11, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-11, S-1
Depth	7.0'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	15.9	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S37

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S37'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S37
Field Sample ID	LT-11, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-11, S-2
Depth	12.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	14.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S38

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S38'.

Client: Alaska DOT&PF, Southcoast Region

CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)

Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S38
Field Sample ID	LT-11, S-3
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-11, S-3
Depth	17.0'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	12.9	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S39
Issue No: 1
This report replaces all previous issues of report no 'MAT:ANC-W1886-S39'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S39
Field Sample ID	LT-11, S-4
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-11, S-4
Depth	22.0'

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	21.2	
Method		B	
Date Tested		11/11/2021	

Particle Size Distribution

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S40

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S40'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S40
Field Sample ID	LT-12, S-1
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-12, S-1
Depth	5.0'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	20.6	
Method		B	
Date Tested		11/11/2021	

Chart

Comments

N/A

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Material Test Report

Report No: MAT:ANC-W1886-S41

Issue No: 1

This report replaces all previous issues of report no 'MAT:ANC-W1886-S41'.

Client: Alaska DOT&PF, Southcoast Region CC:

Project: DOT_SC Haines Beach Road Landslide

AASHTO R18

Reviewed By: Ryan McCormick (Supervising Laboratory Technician)
Date of Issue: 11/18/2021

Sample Details

Sample ID	ANC-W1886-S41
Field Sample ID	LT-12, S-2
Date Sampled	11/12/2021
Source	Haines LT Geo Field Work
Material	Drilling Samples
Specification	Project Specific
Sampling Method	Haines LT Geo Field Work
Sampling Location	See Boring Logs
Bore Hole	LT-12, S-2
Depth	10.0'

Particle Size Distribution

Other Test Results

Description	Method	Result	Limits
Water Content (%)	ASTM D 2216	9.6	
Method		B	
Date Tested		11/11/2021	

Chart

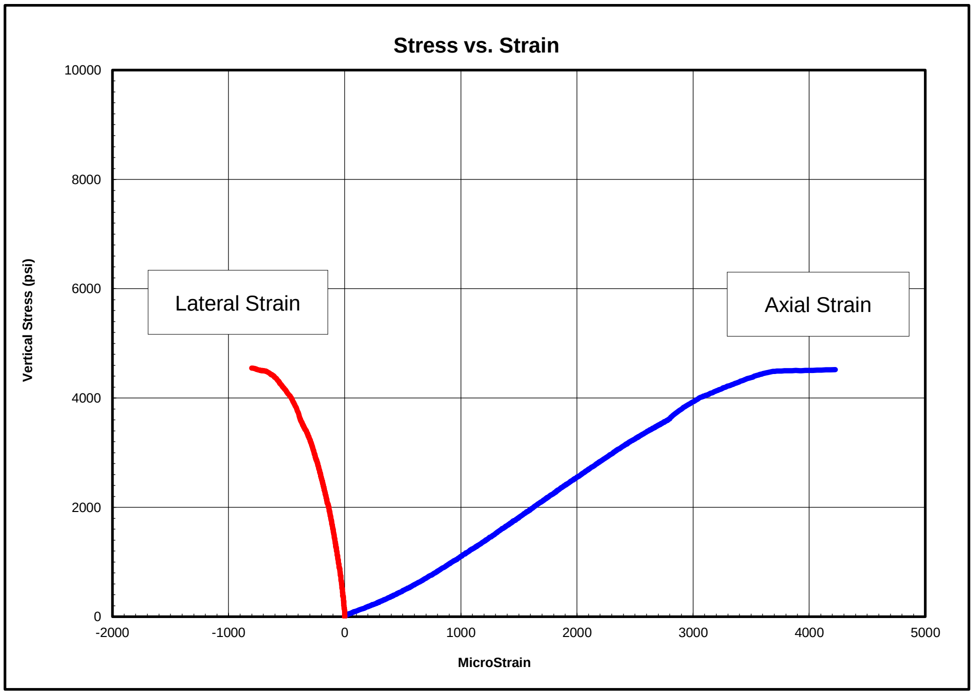
Comments

N/A

Unconfined Compressive Strength (UCS) Tests

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	jsc
Boring ID:	LT-1
Sample ID:	---
Depth, ft:	53.74-54.18
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 4,548 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
500-1700	1,353,000	0.10
1700-2900	1,460,000	0.17
2900-4100	1,320,000	0.27

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

GeoTesting EXPRESS

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-1		
Sample ID:	---		
Depth:	53.74-54.18 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	5.25	5.26	5.26
Specimen Diameter, in:	2.40	2.40	2.40
Specimen Mass, g:	1224		
Bulk Density, lb/ft^3	196	**Minimum Diameter Tolerence Met?**	YES
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	YES

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

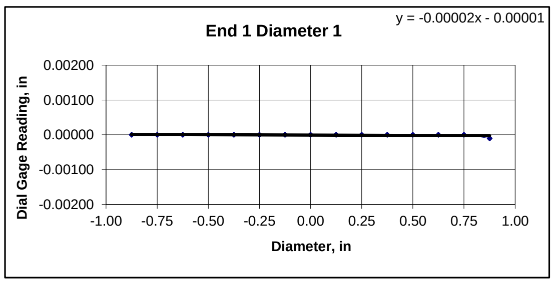
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020

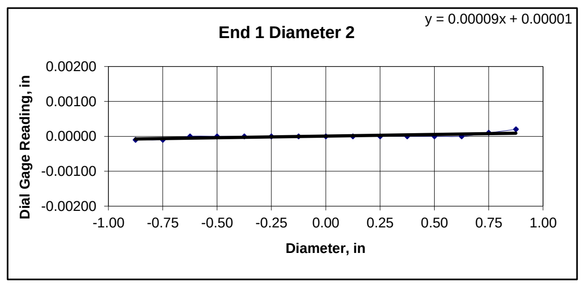
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00030

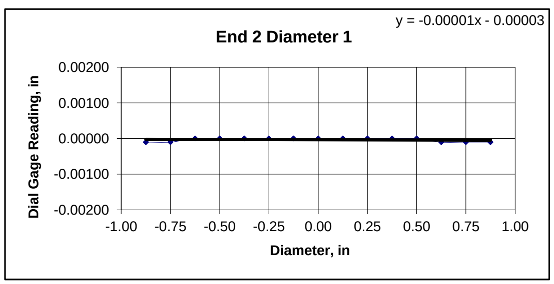
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020

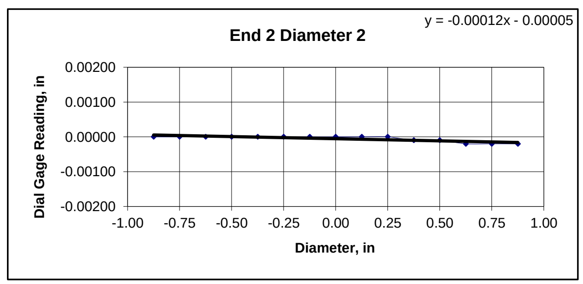
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0002

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015
Flatness Tolerance Met? YES









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
End 2:	
Slope of Best Fit Line	0.00001
Angle of Best Fit Line:	0.00082
Maximum Angular Difference:	0.00033

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00009
Angle of Best Fit Line:	0.00540
End 2:	
Slope of Best Fit Line	0.00012
Angle of Best Fit Line:	0.00704
Maximum Angular Difference:	0.00164

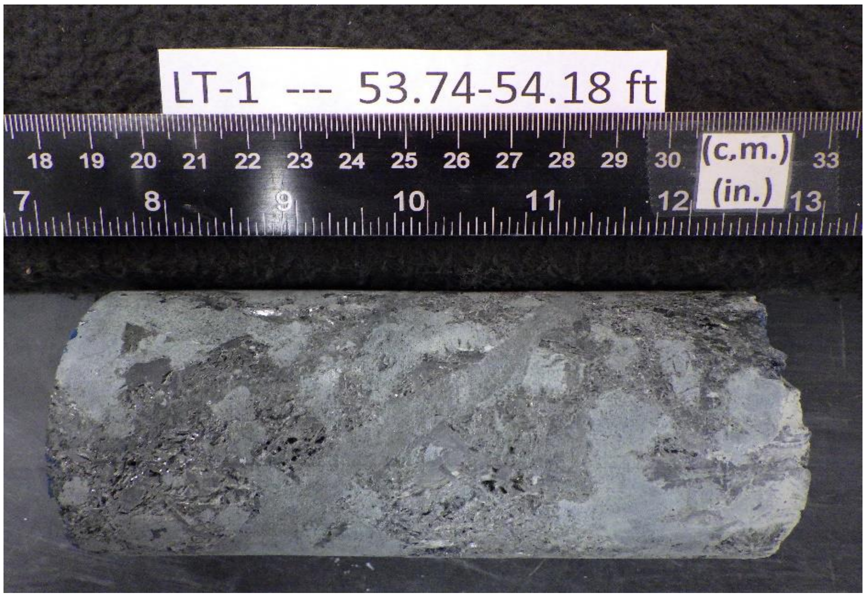
Parallelism Tolerance Met? YES
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

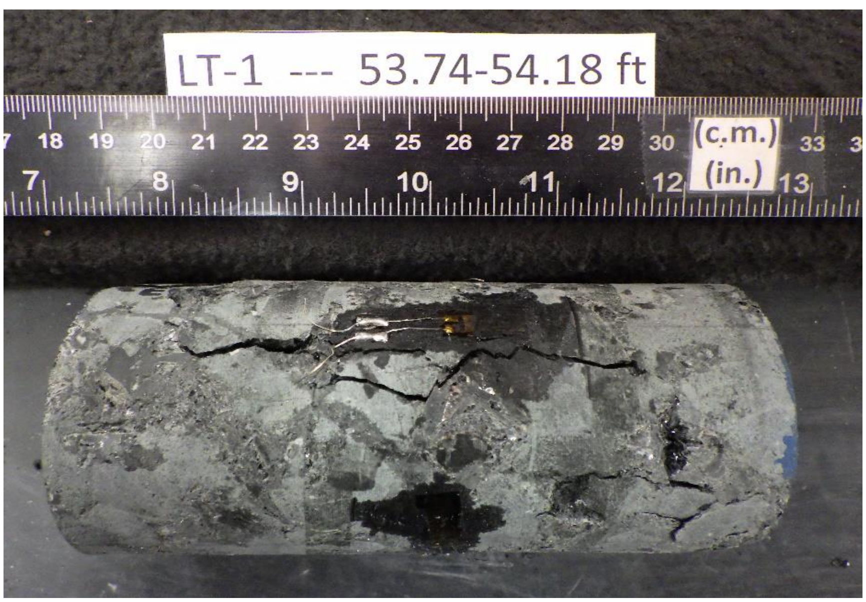
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES

Maximum angle of departure must be $\leq$ 0.25°
Perpendicularity Tolerance Met? YES

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-1
Sample ID:	---
Depth, ft:	53.74-54.18



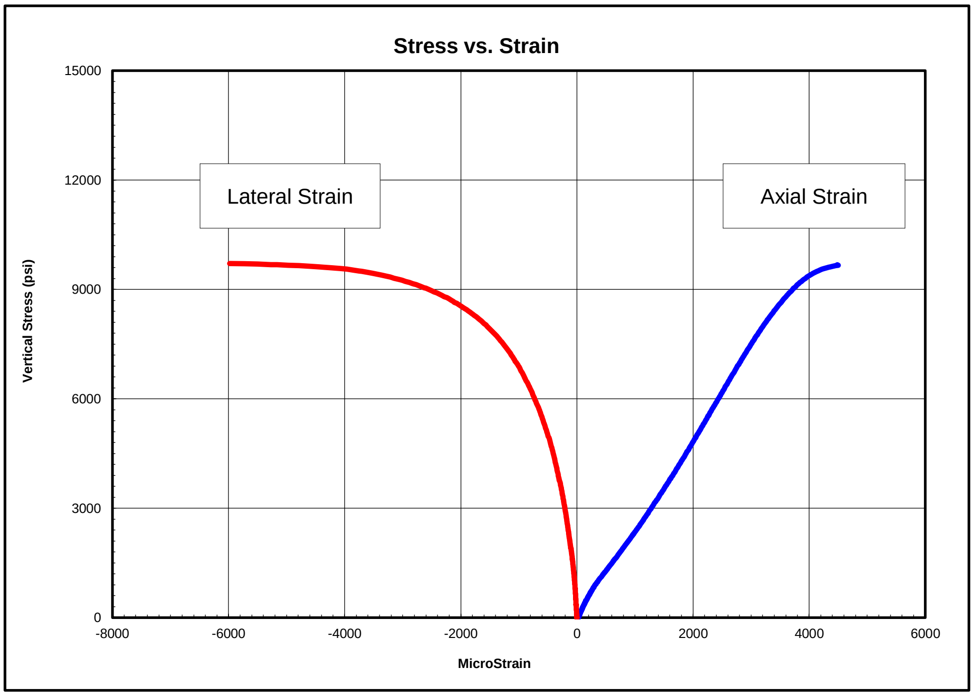
After cutting and grinding



After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	35.00-35.44
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 9,714 psi

The strain values recorded within the second and third stress ranges for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1000-3600	2,210,000	0.20
3600-6200	2,660,000	---
6200-8700	2,450,000	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-3		
Sample ID:	---		
Depth:	35.00-35.44 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.19	5.20	5.20		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1269				
Bulk Density, lb/ft^3	205			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010

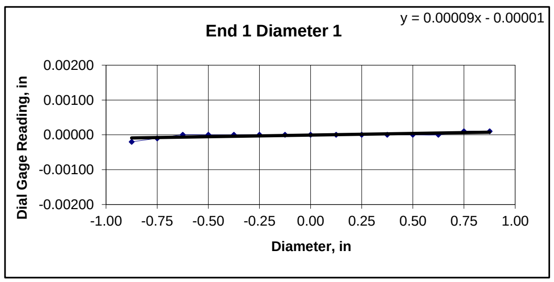
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00010

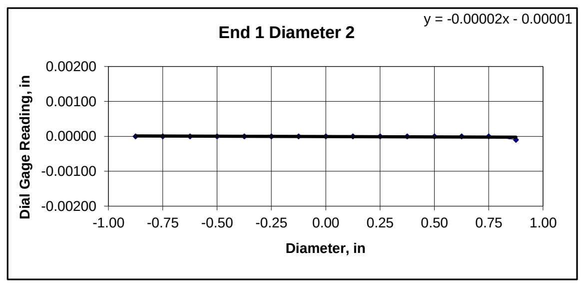
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020

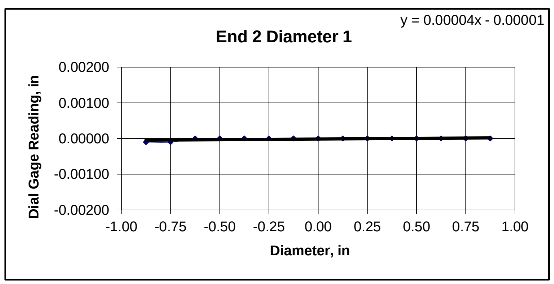
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0002

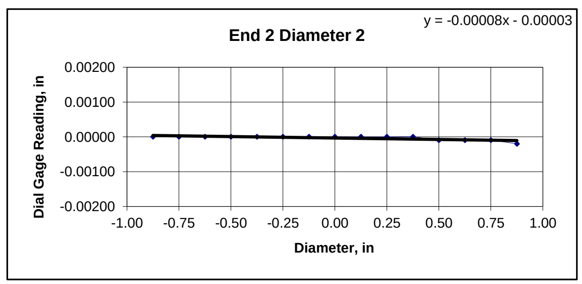
Maximum difference must be < 0.0020 in. Difference = ± 0.00015

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00009
Angle of Best Fit Line:	0.00540
End 2:	
Slope of Best Fit Line	0.00004
Angle of Best Fit Line:	0.00213
Maximum Angular Difference:	0.00327

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
End 2:	
Slope of Best Fit Line	0.00008
Angle of Best Fit Line:	0.00475
Maximum Angular Difference:	0.00360

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

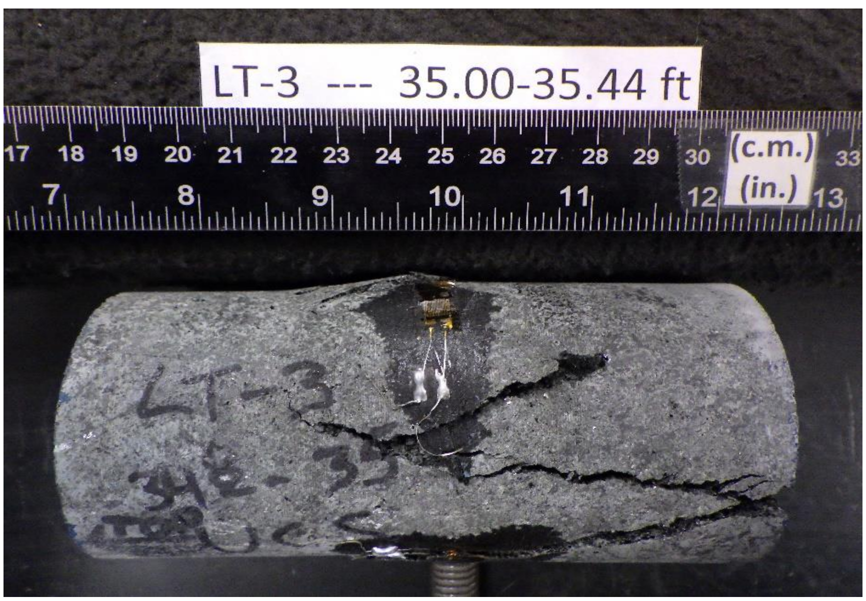
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	35.00-35.44

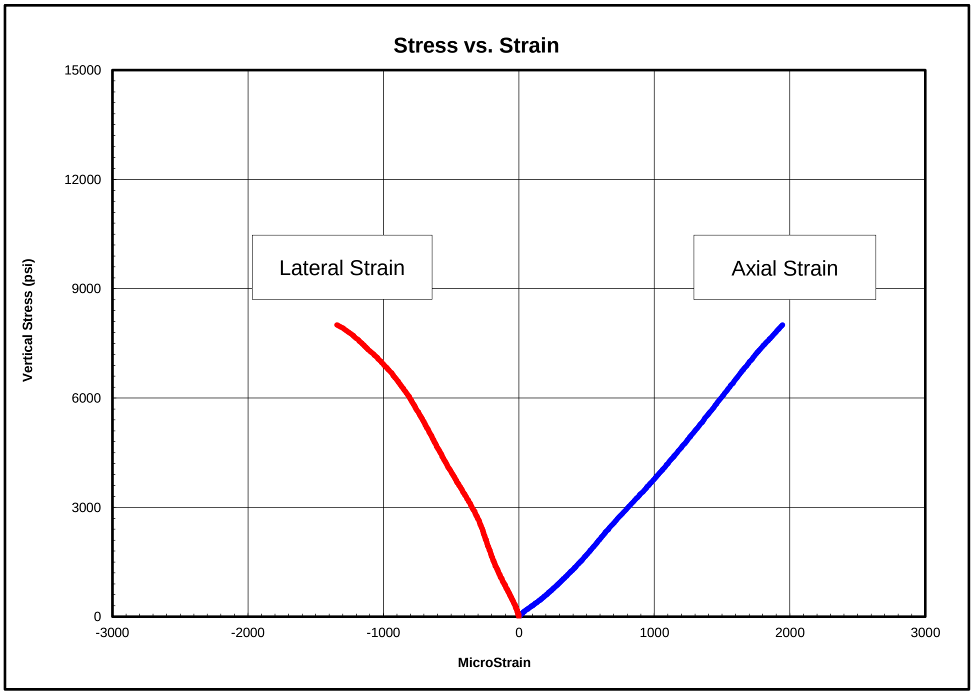
After cutting and grinding



After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	39.0-39.6
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 8,006 psi

The strain values recorded within the second and third stress ranges for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
800-2900	4,110,000	0.44
2900-5100	4,250,000	---
5100-7200	4,710,000	---

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

GeoTesting EXPRESS

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-3		
Sample ID:	---		
Depth:	39.0-39.6 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.17	5.17	5.17		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1312				
Bulk Density, lb/ft^3	213			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

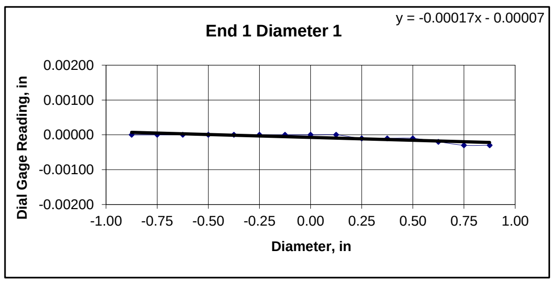
END FLATNESS AND PARALLELISM (Procedure FP1)

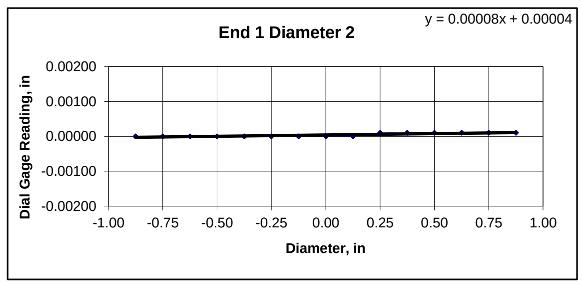
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00030	-0.00030
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010

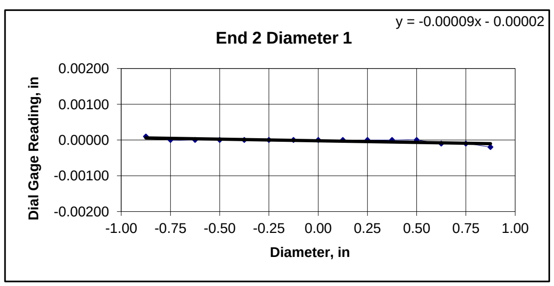
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00010

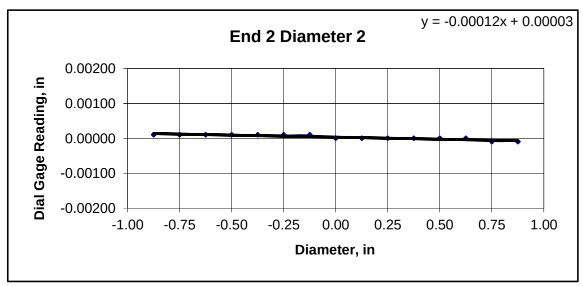
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010

Difference between max and min readings, in:
0° = 0.0003 90° = 0.0002
Maximum difference must be < 0.0020 in. Difference = ± 0.00015
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	Slope of Best Fit Line	0.00017
	Angle of Best Fit Line:	0.00949
End 2:	Slope of Best Fit Line	0.00009
	Angle of Best Fit Line:	0.00524
Maximum Angular Difference:		0.00426

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	Slope of Best Fit Line	0.00008
	Angle of Best Fit Line:	0.00442
End 2:	Slope of Best Fit Line	0.00012
	Angle of Best Fit Line:	0.00671
Maximum Angular Difference:		0.00229

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	39.0-39.6

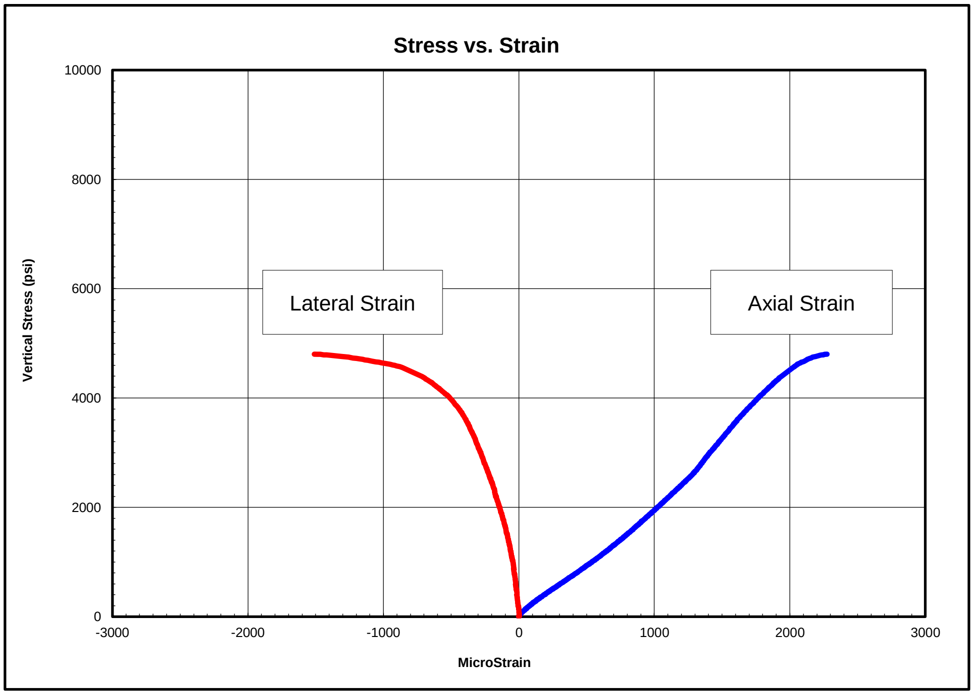
After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	63.27-63.71
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 4,802 psi

The strain values recorded within the third stress range for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
500-1800	1,870,000	0.14
1800-3000	2,450,000	0.33
3000-4300	2,720,000	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-3		
Sample ID:	---		
Depth:	63.27-63.71 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.29	5.29	5.29		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1242				
Bulk Density, lb/ft^3	197	**Minimum Diameter Tolerence Met?**		**YES**	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		**YES**	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020

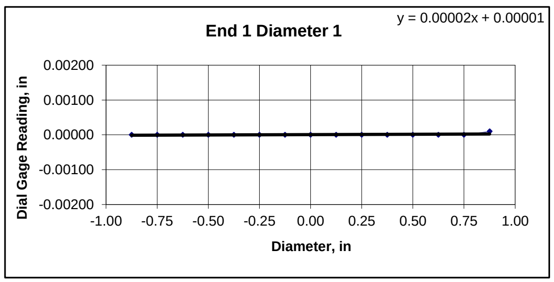
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00020

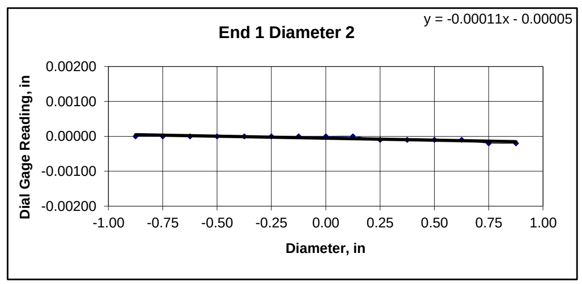
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00020	-0.00020

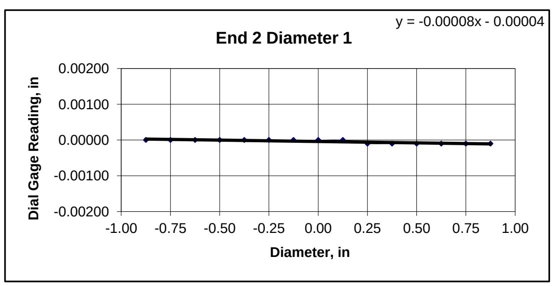
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0003

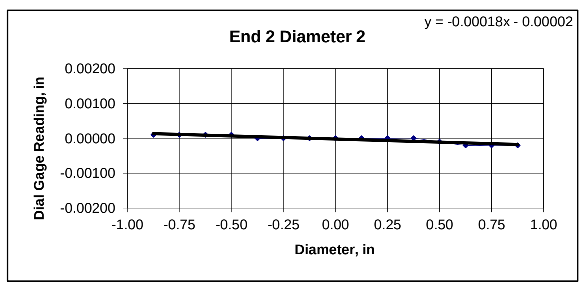
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
End 2:	
Slope of Best Fit Line	0.00008
Angle of Best Fit Line:	0.00442
Maximum Angular Difference:	0.00327

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00011
Angle of Best Fit Line:	0.00655
End 2:	
Slope of Best Fit Line	0.00018
Angle of Best Fit Line:	0.01015
Maximum Angular Difference:	0.00360

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

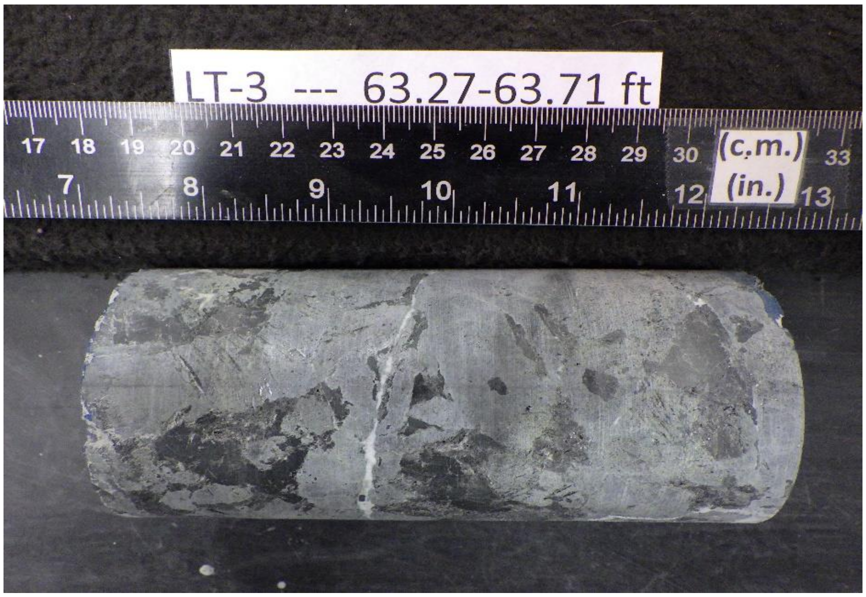
END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES

Maximum angle of departure must be $\leq$ 0.25°

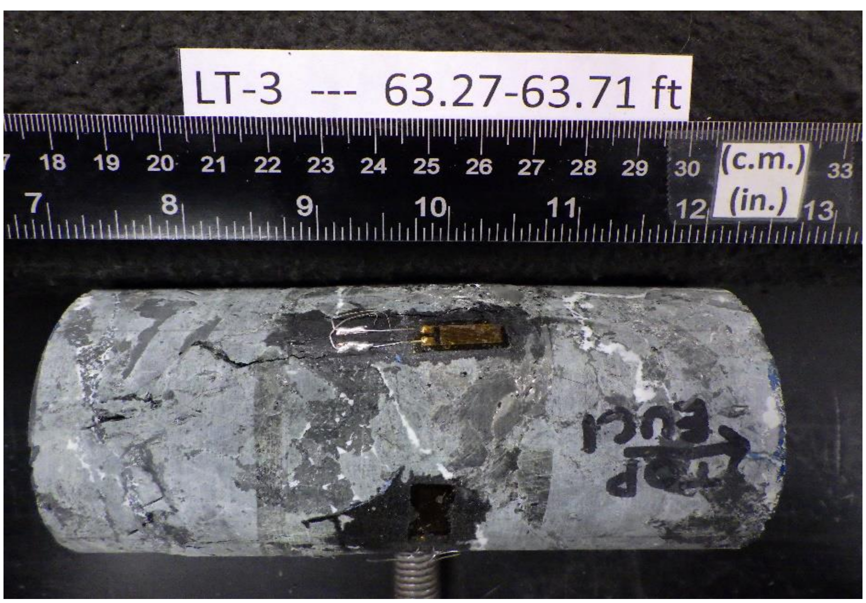
Perpendicularity Tolerance Met? **YES**

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	63.27-63.71



After cutting and grinding

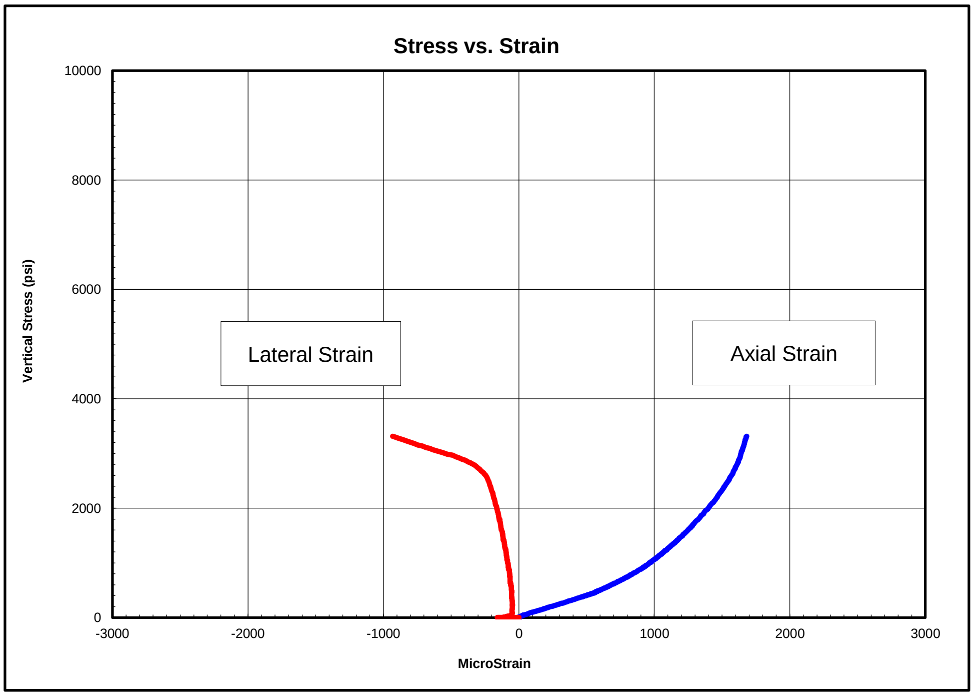


After break

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	63.72-64.16
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 4,799 psi

The strain gauges failed before the peak value was attained. Poisson's Ratio could not be determined within the third stress range.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
500-1800	1,730,000	0.12
1800-3000	3,660,000	---
3000-4300	---	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-3		
Sample ID:	---		
Depth:	63.72-64.16 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average	
Specimen Length, in:	5.27	5.27	5.27	
Specimen Diameter, in:	2.40	2.40	2.40	
Specimen Mass, g:	1239			
Bulk Density, lb/ft^3	198	**Minimum Diameter Tolerence Met?**		**YES**
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

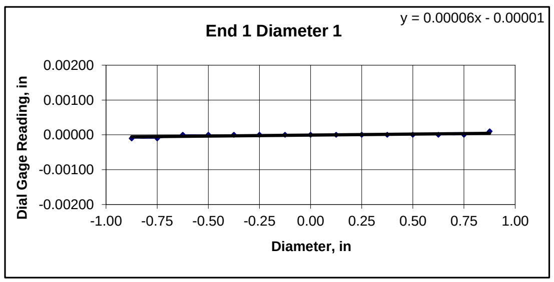
END FLATNESS AND PARALLELISM (Procedure FP1)

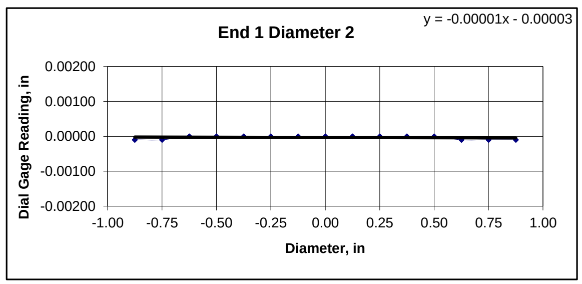
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010

Difference between max and min readings, in:
0° = 0.00020 90° = 0.00010

END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00010	0.00010	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:
0° = 0.0002 90° = 0.0001
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010
Flatness Tolerance Met? **YES**

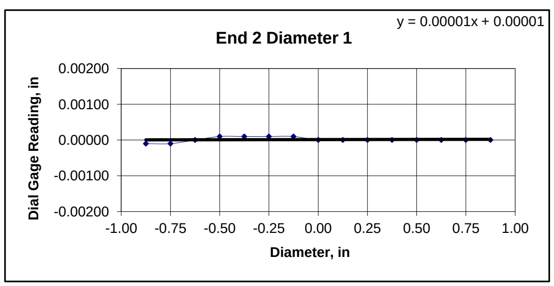


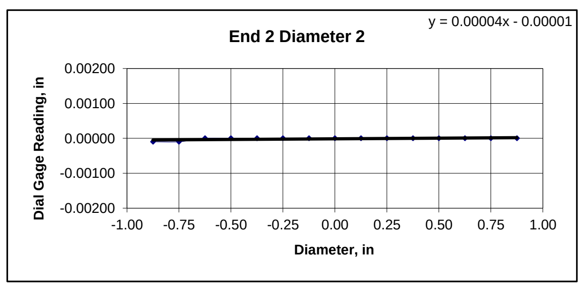


DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00006
	Angle of Best Fit Line:	0.00327
End 2:		
	Slope of Best Fit Line	0.00001
	Angle of Best Fit Line:	0.00049
Maximum Angular Difference:		0.00278

Parallelism Tolerance Met? **YES**
Spherically Seated





DIAMETER 2

End 1:		
	Slope of Best Fit Line	0.00001
	Angle of Best Fit Line:	0.00082
End 2:		
	Slope of Best Fit Line	0.00004
	Angle of Best Fit Line:	0.00213
Maximum Angular Difference:		0.00131

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	2.400	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00020	2.400	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES

Maximum angle of departure must be $\leq$ 0.25°
Perpendicularity Tolerance Met? **YES**

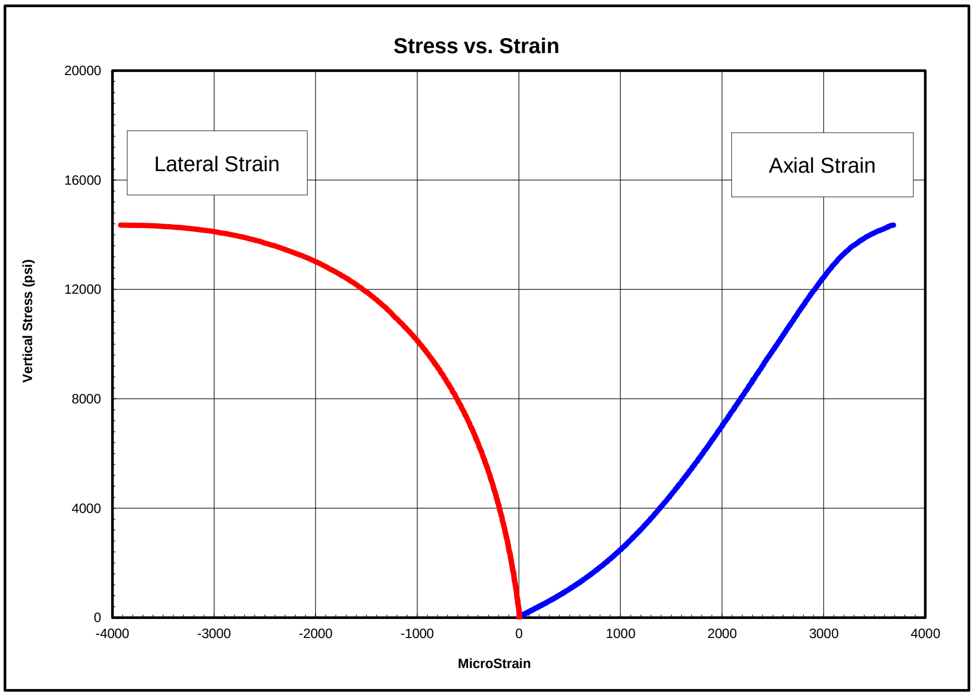
Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-3
Sample ID:	---
Depth, ft:	63.72-64.16

After cutting and grinding

After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-4
Sample ID:	---
Depth, ft:	27.62-28.06
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 14,353 psi

The strain values recorded within the second and third stress ranges for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1400-5300	3,790,000	0.24
5300-9100	5,370,000	---
9100-12900	5,370,000	---

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-4		
Sample ID:	---		
Depth:	27.62-28.06 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.30	5.31	5.31		
Specimen Diameter, in:	2.41	2.41	2.41		
Specimen Mass, g:	1339				
Bulk Density, lb/ft^3	210			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:

Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010

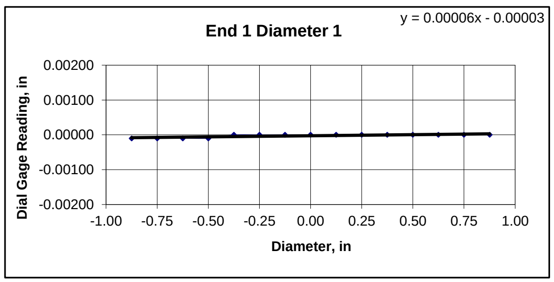
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00010

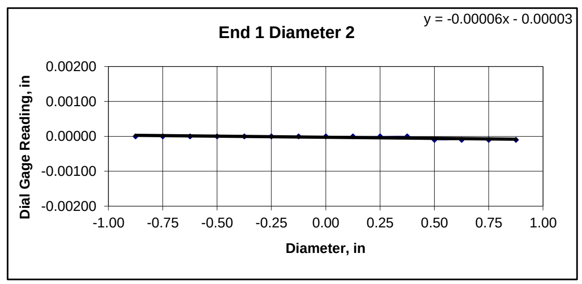
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

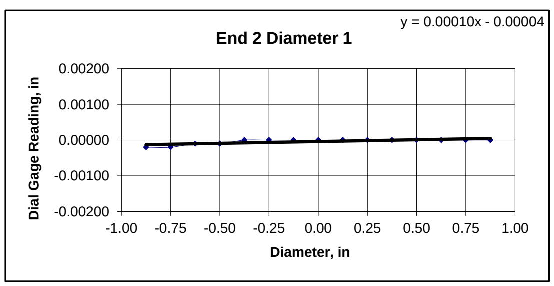
Difference between max and min readings, in:
0° = 0.0002 90° = 0.0002

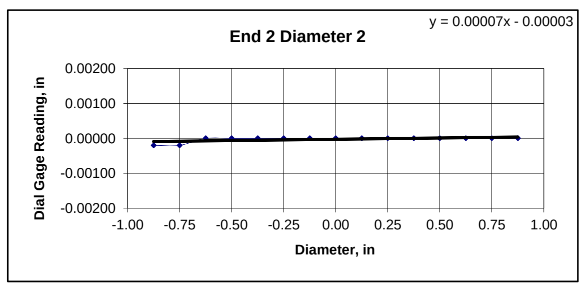
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00010

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:
Slope of Best Fit Line 0.00006
Angle of Best Fit Line: 0.00360

End 2:
Slope of Best Fit Line 0.00010
Angle of Best Fit Line: 0.00573

Maximum Angular Difference: 0.00213

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:
Slope of Best Fit Line 0.00006
Angle of Best Fit Line: 0.00360

End 2:
Slope of Best Fit Line 0.00007
Angle of Best Fit Line: 0.00426

Maximum Angular Difference: 0.00065

Parallelism Tolerance Met? **YES**
Spherically Seated

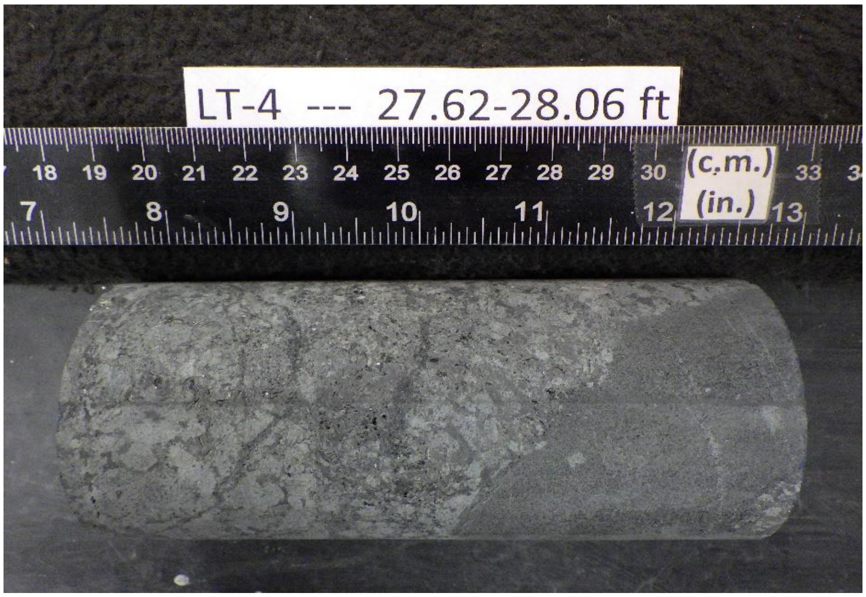
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	2.410	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00010	2.410	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00020	2.410	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00020	2.410	0.00008	0.005	YES

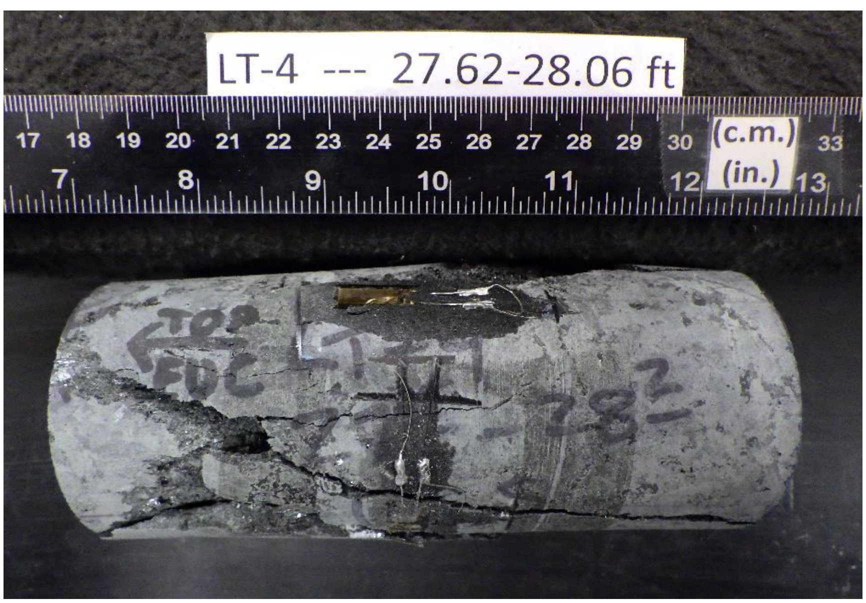
Maximum angle of departure must be $\leq$ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-4
Sample ID:	---
Depth, ft:	27.62-28.06



After cutting and grinding

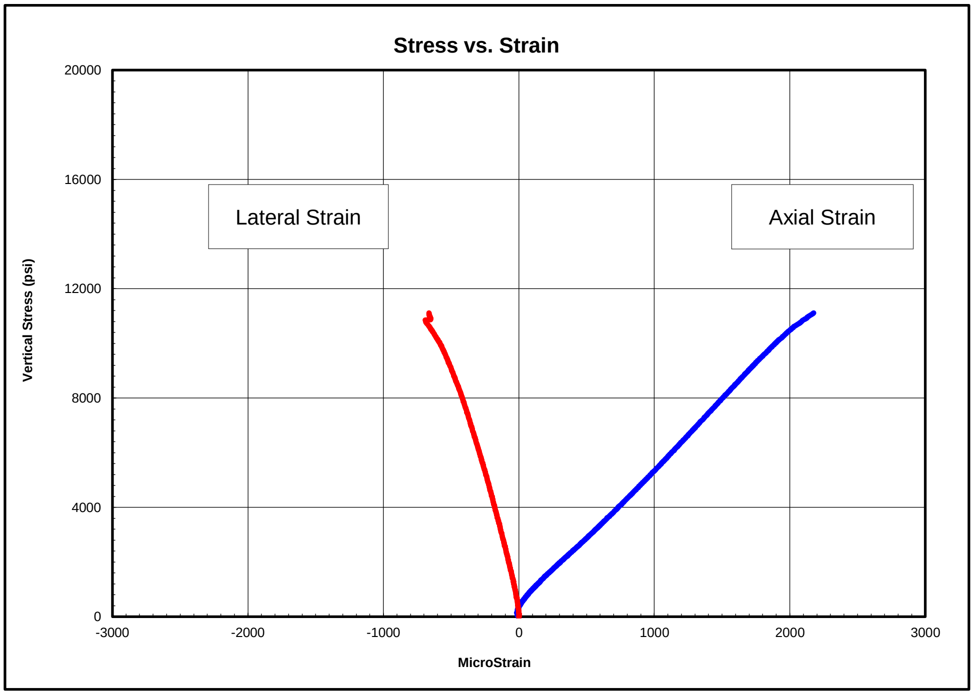


After break

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-4
Sample ID:	---
Depth, ft:	69.99-70.43
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 12,672 psi

The strain values recorded within the third stress range for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1300-4600	4,690,000	0.24
4600-8000	5,250,000	0.32
8000-11400	5,110,000	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-4		
Sample ID:	---		
Depth:	69.99-70.43 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.13	5.13	5.13		
Specimen Diameter, in:	2.41	2.41	2.41		
Specimen Mass, g:	1011				
Bulk Density, lb/ft^3	164			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.1			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00040
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020

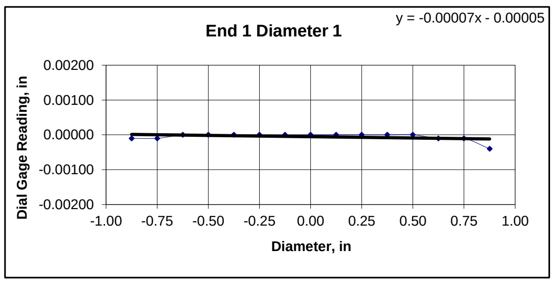
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00030

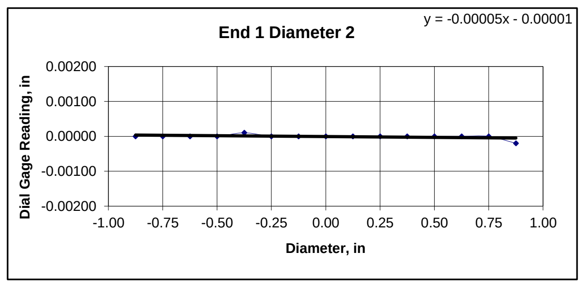
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00030

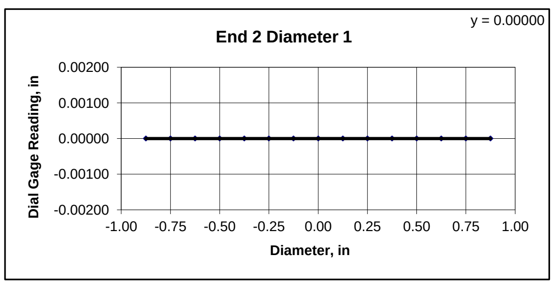
Difference between max and min readings, in:
0° = 0 90° = 0.0003

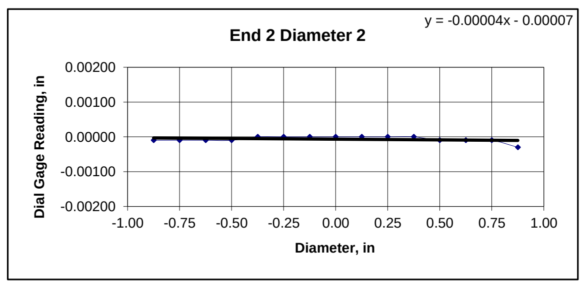
Maximum difference must be < 0.0020 in. Difference = ± 0.00020

Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00007
Angle of Best Fit Line:	0.00426
End 2:	
Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000
Maximum Angular Difference:	0.00426

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00278
End 2:	
Slope of Best Fit Line	0.00004
Angle of Best Fit Line:	0.00229
Maximum Angular Difference:	0.00049

Parallelism Tolerance Met? **YES**
Spherically Seated

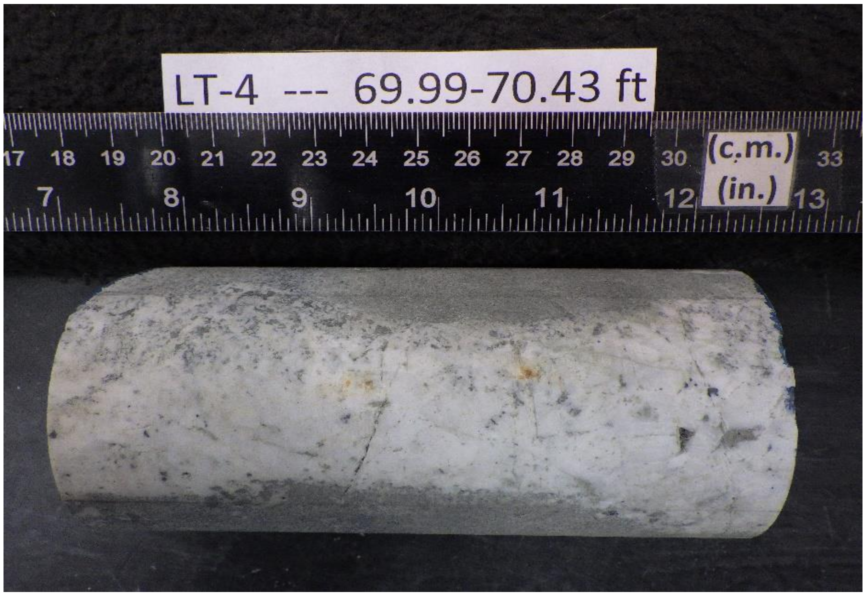
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	2.410	0.00017	0.010	YES
Diameter 2, in (rotated 90°)	0.00030	2.410	0.00012	0.007	YES
END 2					
Diameter 1, in	0.00000	2.410	0.00000	0.000	YES
Diameter 2, in (rotated 90°)	0.00030	2.410	0.00012	0.007	YES

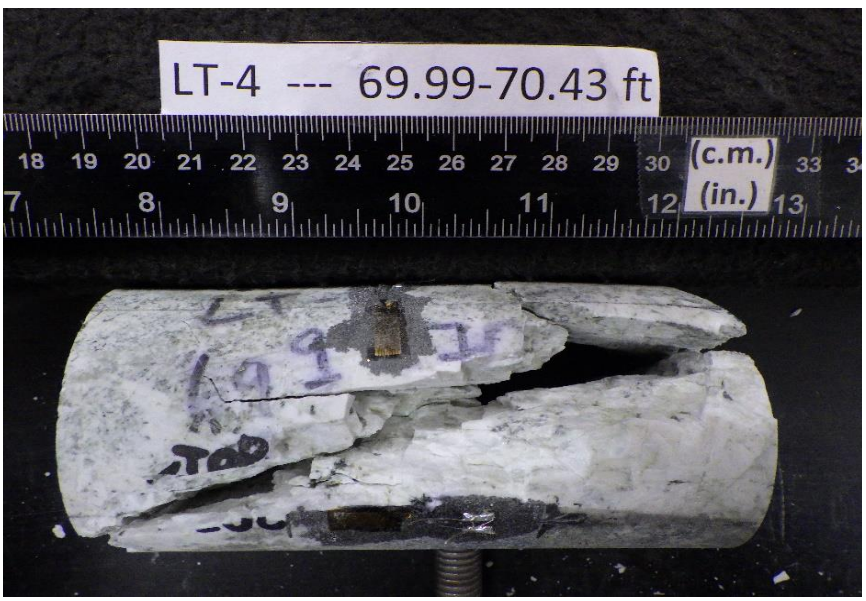
Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-4
Sample ID:	---
Depth, ft:	69.99-70.43



After cutting and grinding

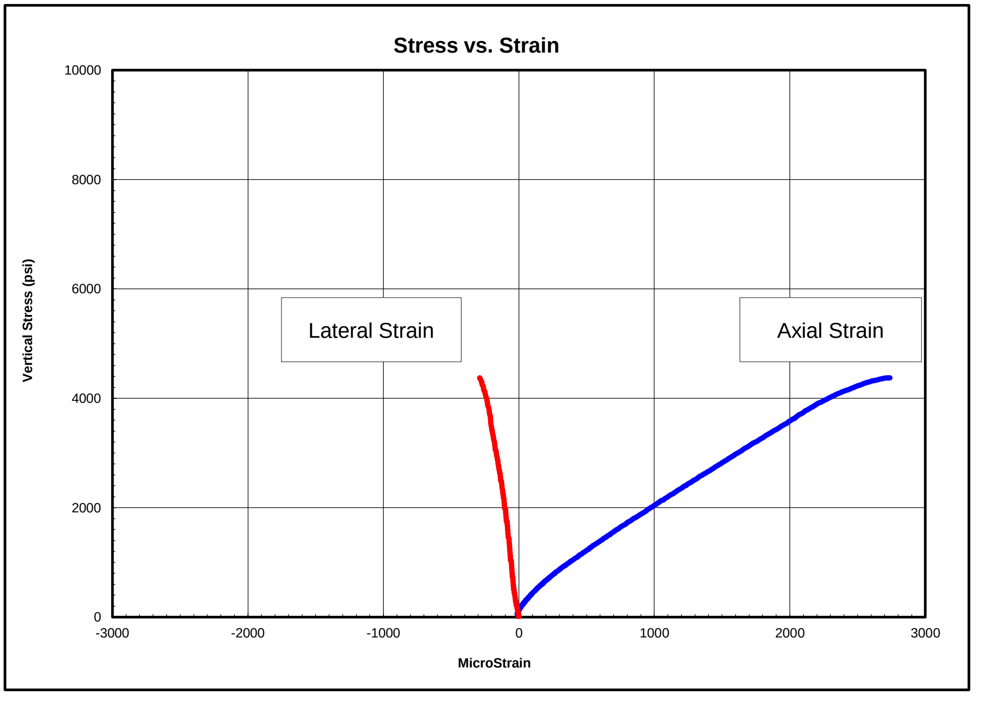


After break

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-5
Sample ID:	---
Depth, ft:	38.8-39.4
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 4,374 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
400-1600	1,860,000	0.08
1600-2800	1,580,000	0.09
2800-3900	1,530,000	0.11

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-5		
Sample ID:	---		
Depth:	38.8-39.4 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.10	5.11	5.11		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1201				
Bulk Density, lb/ft^3	198			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.1			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

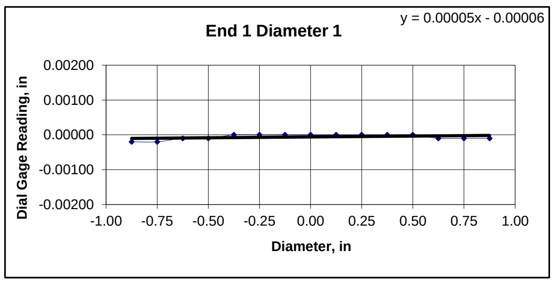
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00020	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	-0.00030	-0.00020	-0.00020	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00010	0.00010	0.00000	0.00000	0.00000	0.00010	-0.00020

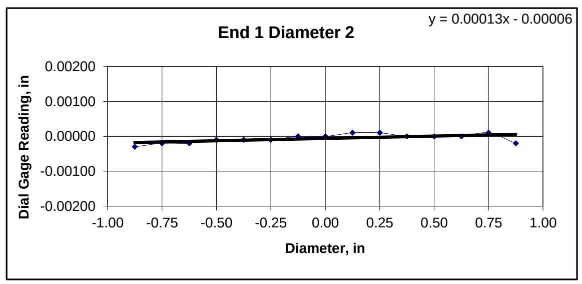
Difference between max and min readings, in:
0° = 0.00020 90° = 0.00040

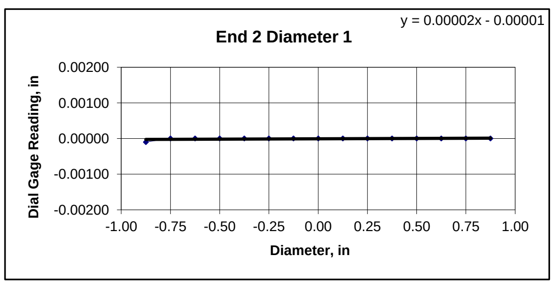
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00020	0.00020	0.00020	0.00020	0.00020	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010

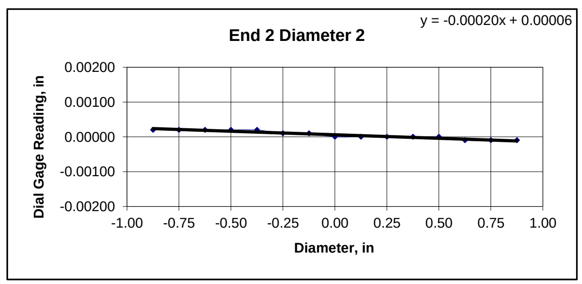
Difference between max and min readings, in:
0° = 0.0001 90° = 0.0003

Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00278
End 2:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
Maximum Angular Difference:	0.00164

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00013
Angle of Best Fit Line:	0.00769
End 2:	
Slope of Best Fit Line	0.00020
Angle of Best Fit Line:	0.01162
Maximum Angular Difference:	0.00393

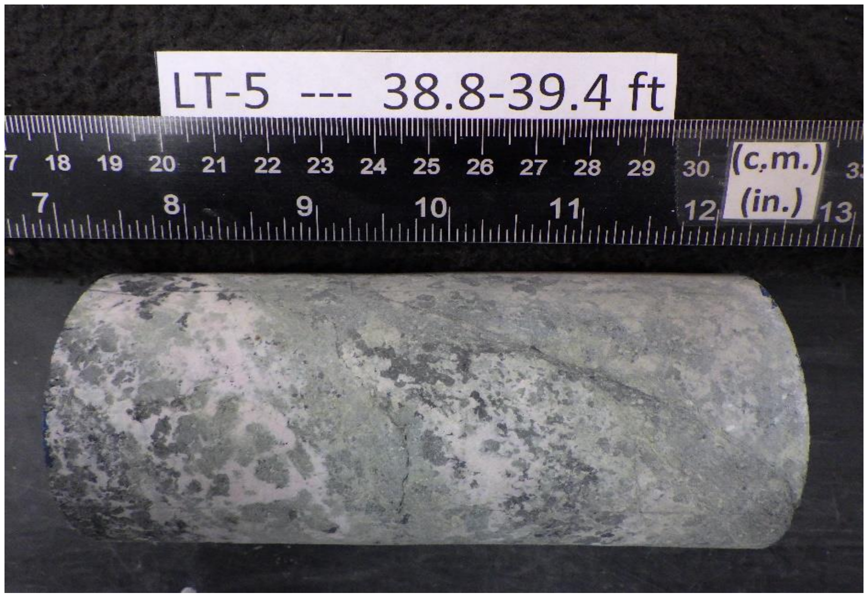
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	2.400	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00040	2.400	0.00017	0.010	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES

Maximum angle of departure must be $\leq$ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-5
Sample ID:	---
Depth, ft:	38.8-39.4

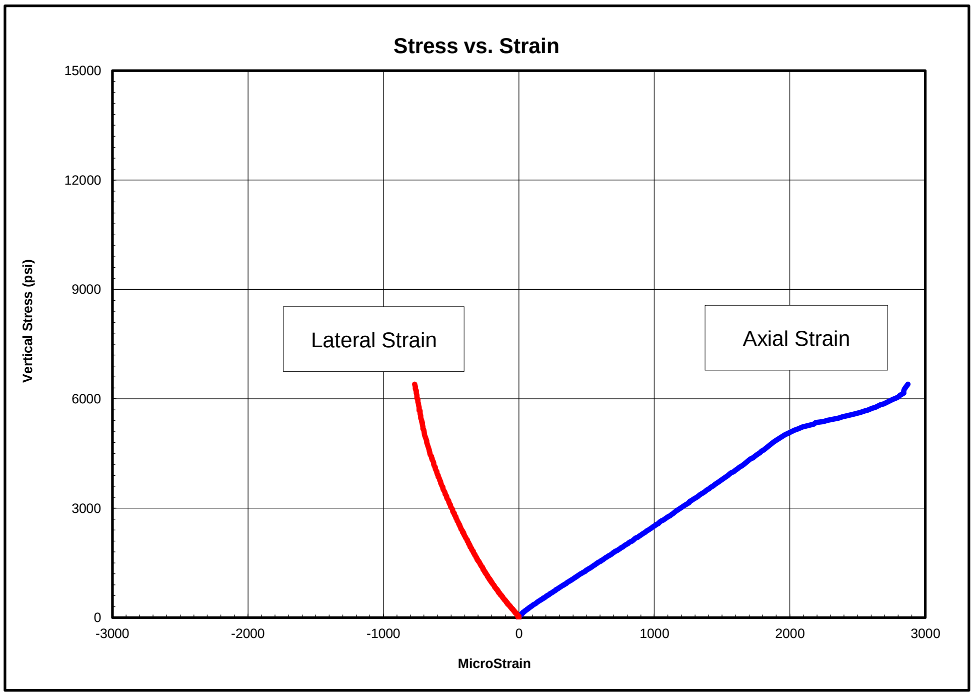


After cutting and grinding

After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-5
Sample ID:	---
Depth, ft:	70.55-70.99
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 10,719 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1100-3900	2,470,000	0.33
3900-6800	1,680,000	0.11
6800-9600	3,200,000	0.21

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

GeoTesting EXPRESS	Client:	Landslide Technology	Test Date:	12/27/2021
	Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
	Project Location:	2930	Checked By:	smd
	GTX #:	314747		
	Boring ID:	LT-5		
	Sample ID:	---		
	Depth:	70.55-70.99 ft		
	Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.29	5.29	5.29		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1286				
Bulk Density, lb/ft^3	204			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap $\leq$ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

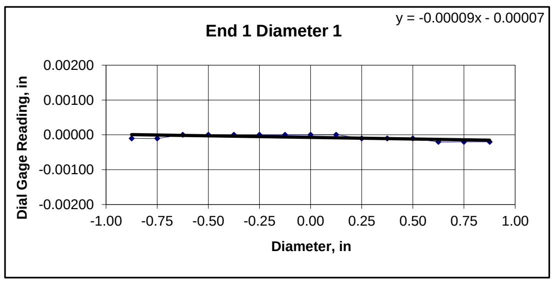
END FLATNESS AND PARALLELISM (Procedure FP1)

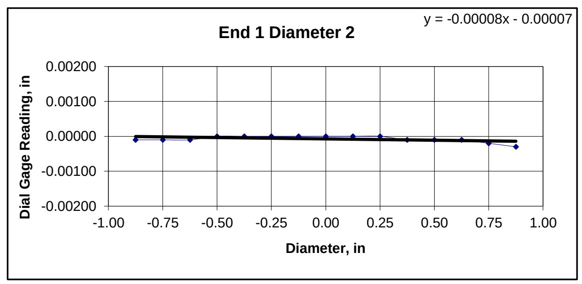
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00020	-0.00030

Difference between max and min readings, in:
0° = 0.00020 90° = 0.00030

END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010	-0.00010

Difference between max and min readings, in:
0° = 0.0001 90° = 0.0001
Maximum difference must be < 0.0020 in. Difference = $\pm$ 0.00015
Flatness Tolerance Met? **YES**

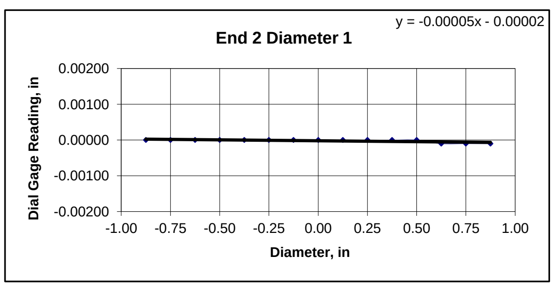


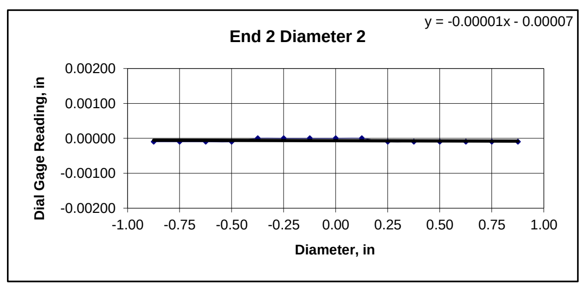


DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00009
	Angle of Best Fit Line:	0.00524
End 2:		
	Slope of Best Fit Line	0.00005
	Angle of Best Fit Line:	0.00295
Maximum Angular Difference:		0.00229

Parallelism Tolerance Met? **YES**
Spherically Seated





DIAMETER 2

End 1:		
	Slope of Best Fit Line	0.00008
	Angle of Best Fit Line:	0.00442
End 2:		
	Slope of Best Fit Line	0.00001
	Angle of Best Fit Line:	0.00082
Maximum Angular Difference:		0.00360

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00020	2.400	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES

Maximum angle of departure must be $\leq$ 0.25°
Perpendicularity Tolerance Met? **YES**

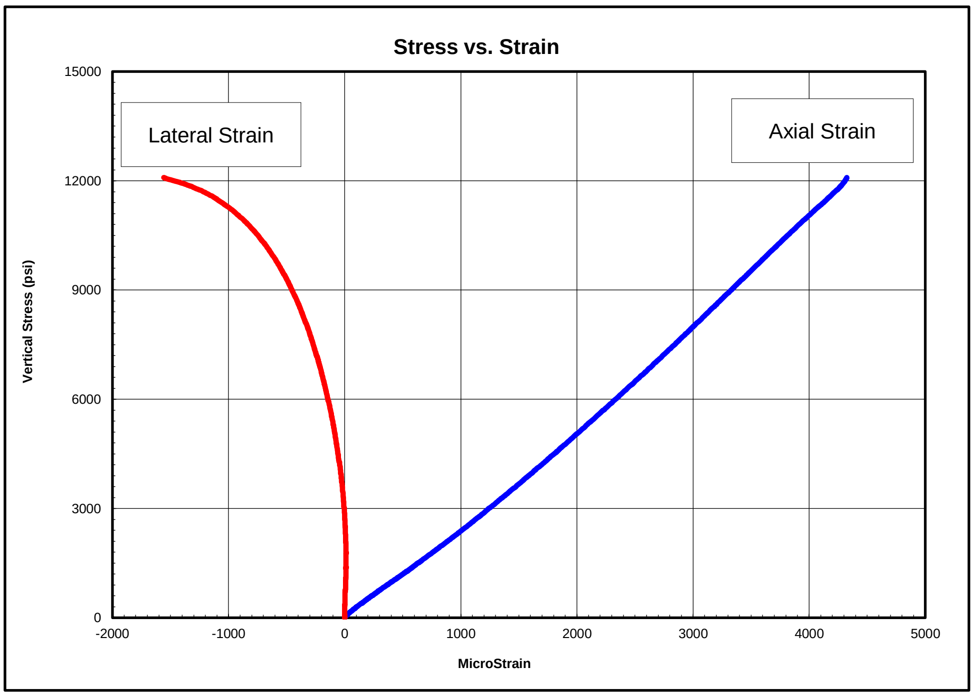
Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-5
Sample ID:	---
Depth, ft:	70.55-70.99

After cutting and grinding

After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-7
Sample ID:	---
Depth, ft:	21.2-21.8
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 12,088 psi

The strain values recorded within the third stress range for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1200-4400	2,520,000	0.05
4400-7700	2,900,000	0.21
7700-10900	3,080,000	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-7		
Sample ID:	---		
Depth:	21.2-21.8 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.21	5.21	5.21		
Specimen Diameter, in:	2.40	2.40	2.40		
Specimen Mass, g:	1227				
Bulk Density, lb/ft^3	198			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

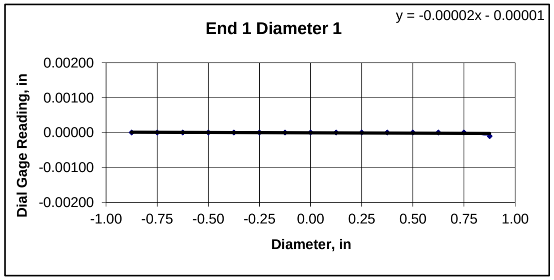
END FLATNESS AND PARALLELISM (Procedure FP1)

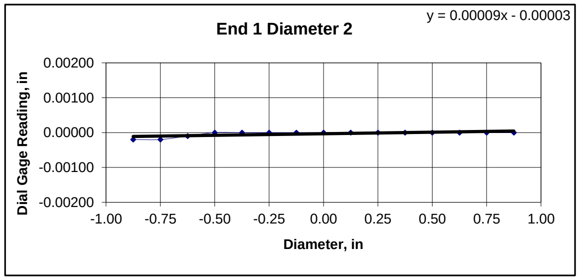
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010
Diameter 2, in (rotated 90°)	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

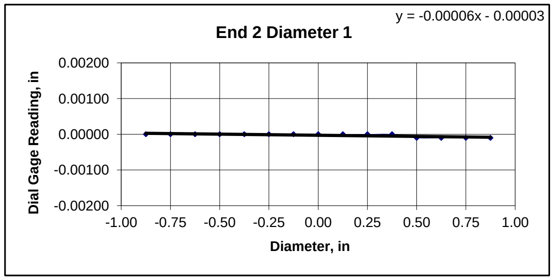
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00020

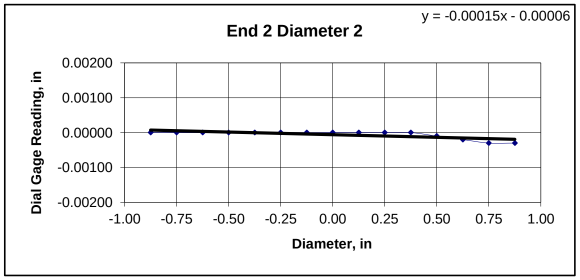
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00010	-0.00010
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00030

Difference between max and min readings, in:
0° = 0.0001 90° = 0.0003
Maximum difference must be < 0.0020 in. Difference = ± 0.00015
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
End 2:	
Slope of Best Fit Line	0.00006
Angle of Best Fit Line:	0.00360
Maximum Angular Difference:	0.00246
Parallelism Tolerance Met?	**YES**

Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00009
Angle of Best Fit Line:	0.00507
End 2:	
Slope of Best Fit Line	0.00015
Angle of Best Fit Line:	0.00868
Maximum Angular Difference:	0.00360
Parallelism Tolerance Met?	**YES**

Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00020	2.400	0.00008	0.005	YES
END 2					
Diameter 1, in	0.00010	2.400	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00030	2.400	0.00013	0.007	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

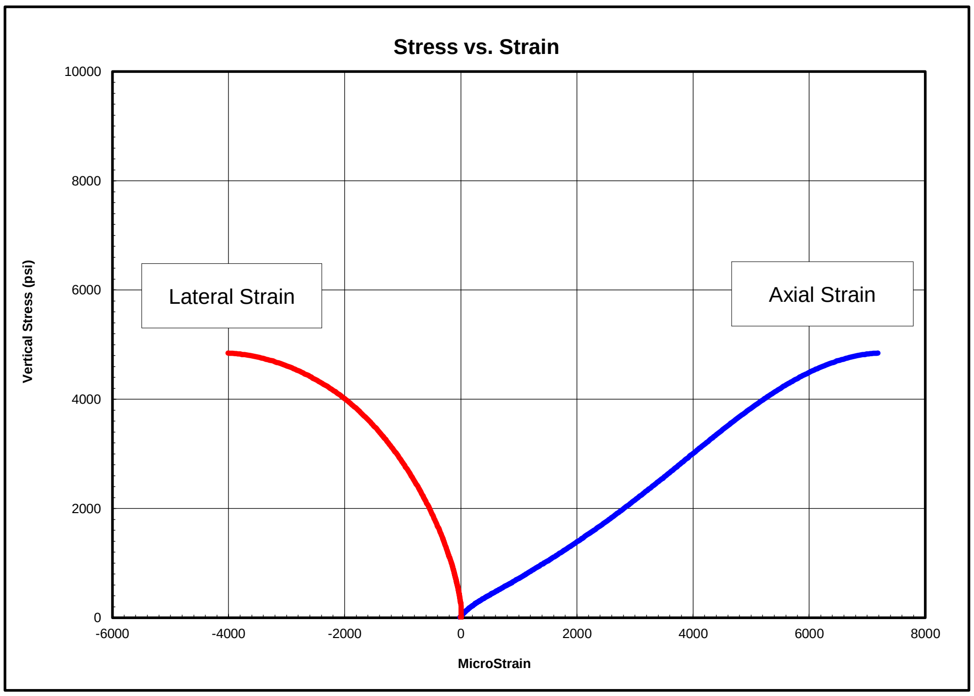
Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/4/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-7
Sample ID:	---
Depth, ft:	21.2-21.8

After cutting and grinding

After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-7
Sample ID:	---
Depth, ft:	47.65-48.09
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 4,846 psi

The strain values recorded within the third stress range for this test produce values of Poisson's Ratio that exceed maximum values found in rocks.

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
500-1800	671,000	0.21
1800-3100	838,000	0.46
3100-4400	765,000	---

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

GeoTesting EXPRESS

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-7		
Sample ID:	---		
Depth:	47.65-48.09 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.22	5.22	5.22		
Specimen Diameter, in:	2.39	2.40	2.40		
Specimen Mass, g:	1243				
Bulk Density, lb/ft³	201	**Minimum Diameter Tolerence Met?**		YES	
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**		YES	

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.

Straightness Tolerance Met? YES

END FLATNESS AND PARALLELISM (Procedure FP1)

END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00030	-0.00040
Diameter 2, in (rotated 90°)	0.00030	0.00030	0.00030	0.00020	0.00010	0.00010	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00010	-0.00020	-0.00030	-0.00040

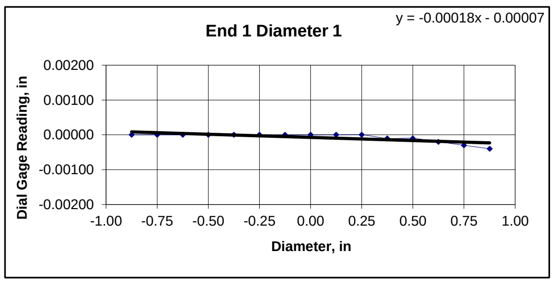
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00070

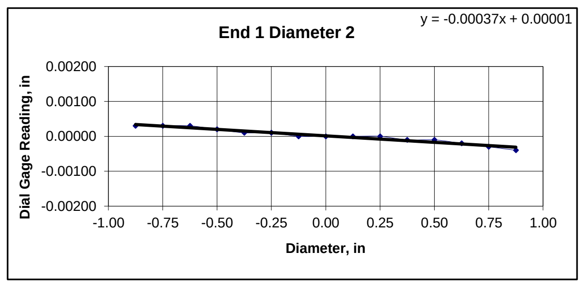
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00020	0.00020	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00020	-0.00020
Diameter 2, in (rotated 90°)	-0.00060	-0.00050	-0.00030	-0.00030	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020	0.00020

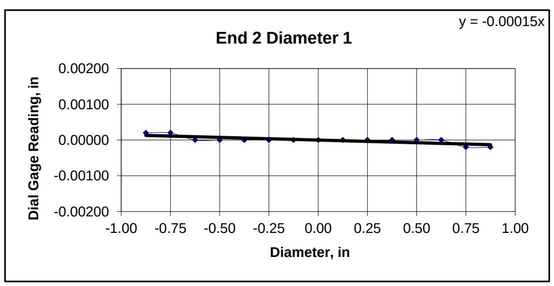
Difference between max and min readings, in:
0° = 0.0004 90° = 0.0008

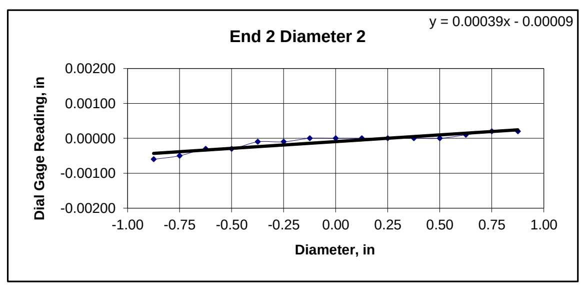
Maximum difference must be < 0.0020 in. Difference = ± 0.00040

Flatness Tolerance Met? YES









DIAMETER 1

End 1:		
	Slope of Best Fit Line	0.00018
	Angle of Best Fit Line:	0.01031
End 2:		
	Slope of Best Fit Line	0.00015
	Angle of Best Fit Line:	0.00851
Maximum Angular Difference:		0.00180

Parallelism Tolerance Met? YES
Spherically Seated

DIAMETER 2

End 1:		
	Slope of Best Fit Line	0.00037
	Angle of Best Fit Line:	0.02128
End 2:		
	Slope of Best Fit Line	0.00039
	Angle of Best Fit Line:	0.02210
Maximum Angular Difference:		0.00082

Parallelism Tolerance Met? YES
Spherically Seated

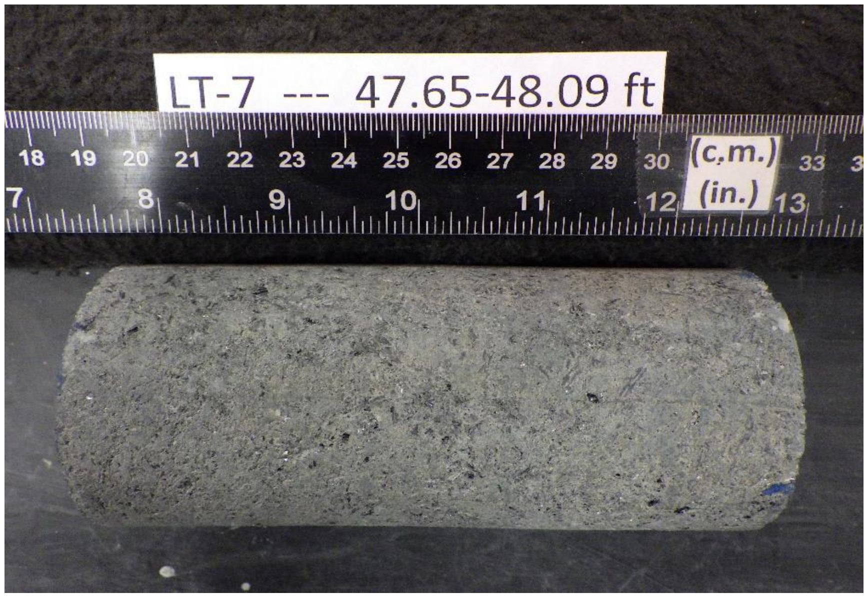
PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	2.395	0.00017	0.010	YES
Diameter 2, in (rotated 90°)	0.00070	2.395	0.00029	0.017	YES
END 2					
Diameter 1, in	0.00040	2.395	0.00017	0.010	YES
Diameter 2, in (rotated 90°)	0.00080	2.395	0.00033	0.019	YES

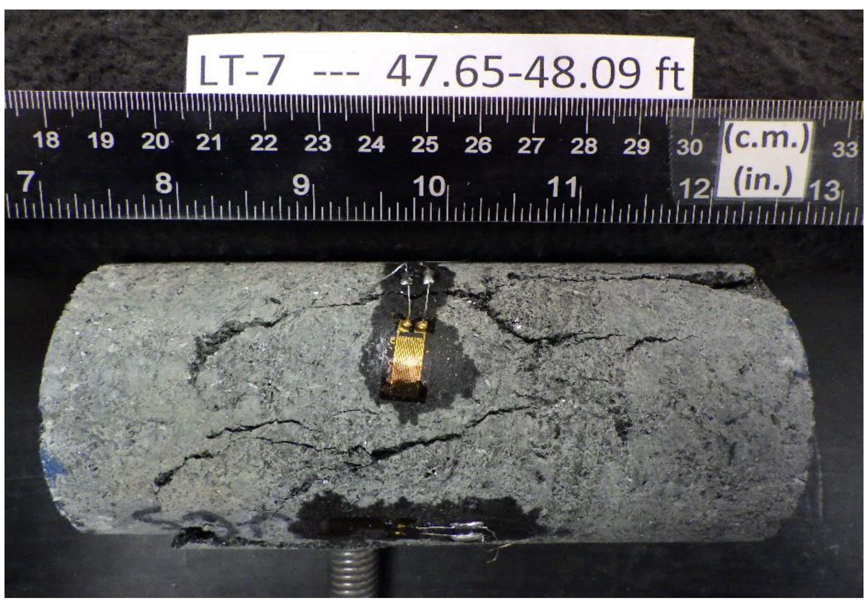
Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? YES

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	1/3/2022
Tested By:	kdp
Checked By:	smd
Boring ID:	LT-7
Sample ID:	---
Depth, ft:	47.65-48.09



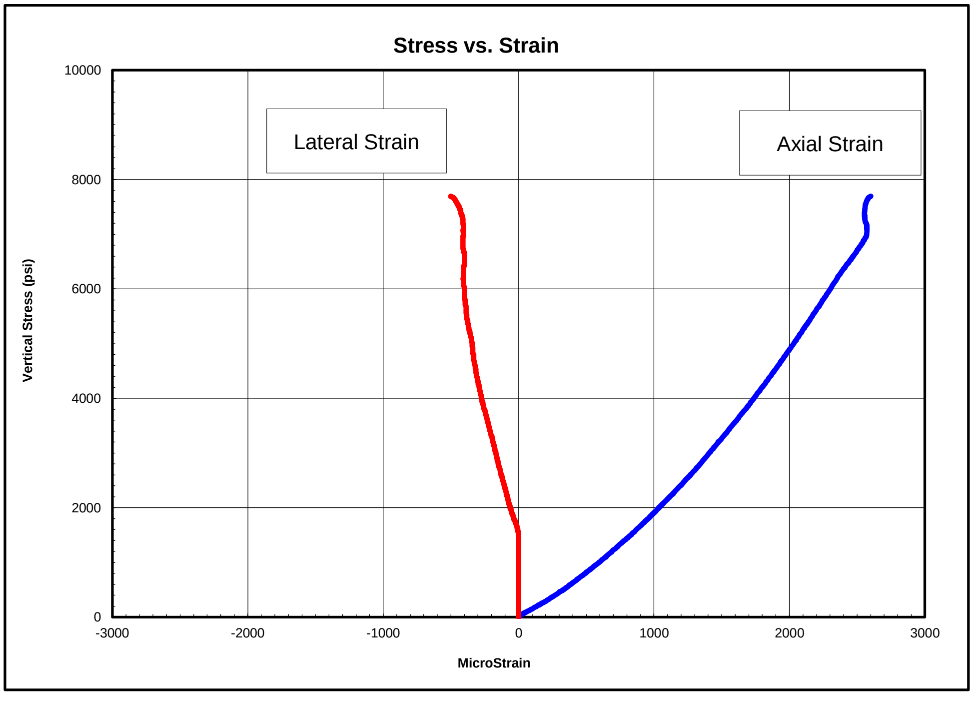
After cutting and grinding



After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-8
Sample ID:	---
Depth, ft:	16.51-16.95
Sample Type:	rock core
Sample Description:	See photographs Intact material and discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 7,696 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
800-2800	2,360,000	0.22
2800-4900	3,160,000	0.30
4900-6900	3,630,000	0.14

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-8		
Sample ID:	---		
Depth:	16.51-16.95 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average
Specimen Length, in:	5.31	5.31	5.31
Specimen Diameter, in:	2.40	2.40	2.40
Specimen Mass, g:	1340		
Bulk Density, lb/ft^3	212	**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2	**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? NO

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **NO**

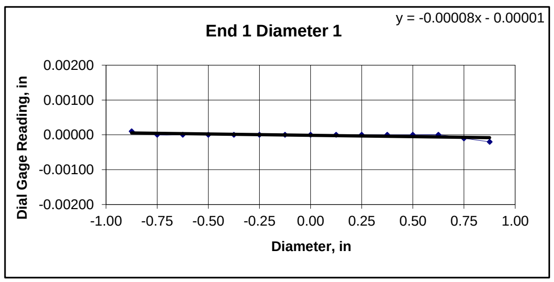
END FLATNESS AND PARALLELISM (Procedure FP1)

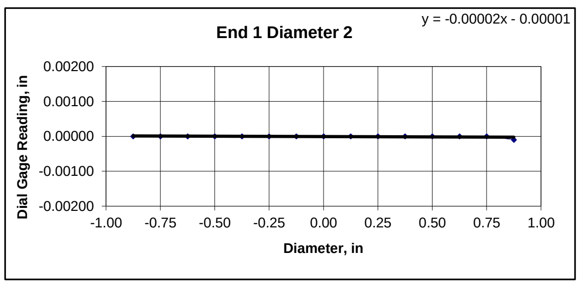
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010

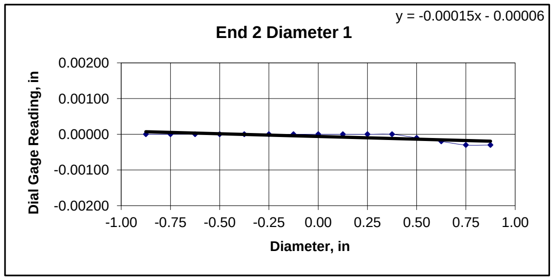
Difference between max and min readings, in:
0° = 0.00030 90° = 0.00010

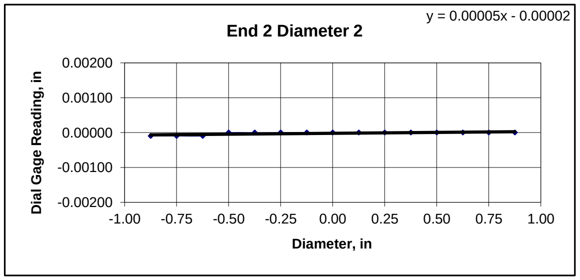
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	-0.00010	-0.00020	-0.00030	-0.00030
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:
0° = 0.0003 90° = 0.0001
Maximum difference must be < 0.0020 in. Difference = ± 0.00015
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00008
Angle of Best Fit Line:	0.00442
End 2:	
Slope of Best Fit Line	0.00015
Angle of Best Fit Line:	0.00868
Maximum Angular Difference:	0.00426
Parallelism Tolerance Met?	**YES**
Spherically Seated	

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00002
Angle of Best Fit Line:	0.00115
End 2:	
Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00295
Maximum Angular Difference:	0.00180
Parallelism Tolerance Met?	**YES**
Spherically Seated	

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES
END 2					
Diameter 1, in	0.00030	2.400	0.00013	0.007	YES
Diameter 2, in (rotated 90°)	0.00010	2.400	0.00004	0.002	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-8
Sample ID:	---
Depth, ft:	16.51-16.95

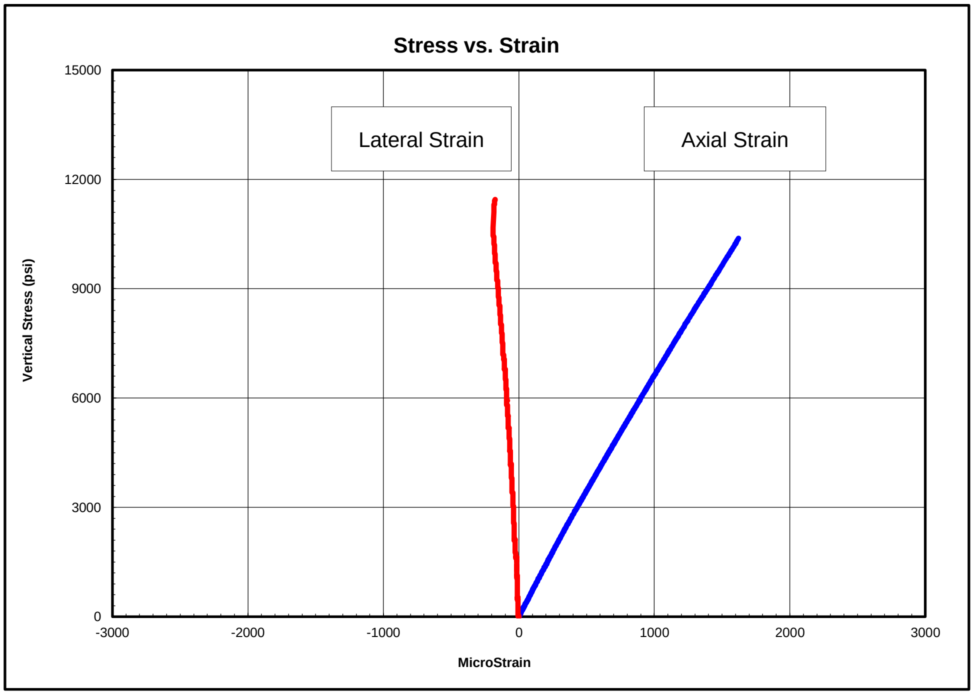
After cutting and grinding

After break

GeoTesting EXPRESS

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-11
Sample ID:	---
Depth, ft:	41.41-41.85
Sample Type:	rock core
Sample Description:	See photographs Intact material failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 11,450 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
1100-4200	6,710,000	0.10
4200-7300	6,270,000	0.11
7300-10300	5,980,000	0.14

Notes: Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-11		
Sample ID:	---		
Depth:	41.41-41.85 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.27	5.28	5.28		
Specimen Diameter, in:	2.41	2.41	2.41		
Specimen Mass, g:	1268				
Bulk Density, lb/ft^3	200			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

END FLATNESS AND PARALLELISM (Procedure FP1)

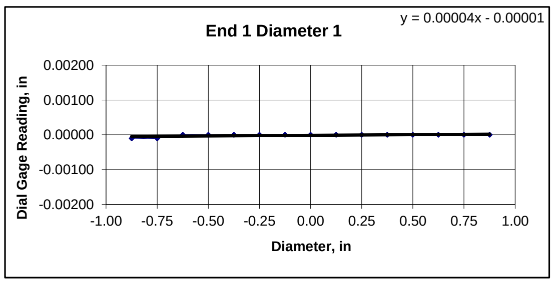
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

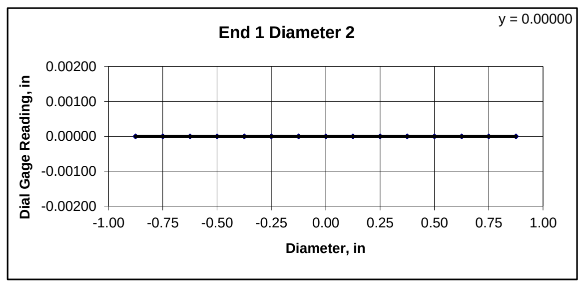
Difference between max and min readings, in:
0° = 0.00010 90° = 0.00000

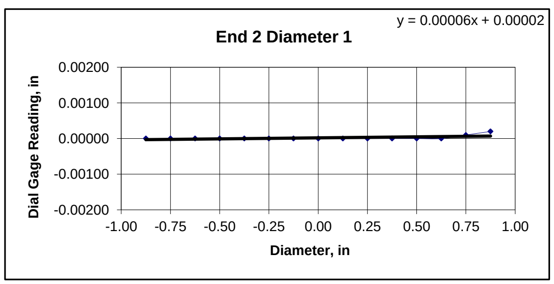
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00010	0.00020
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

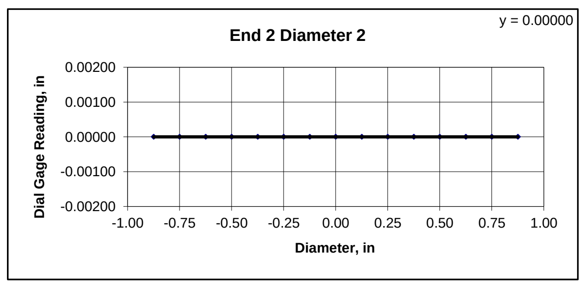
Difference between max and min readings, in:
0° = 0.0002 90° = 0

Maximum difference must be < 0.0020 in. Difference = ± 0.00010
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00004
Angle of Best Fit Line:	0.00213
End 2:	
Slope of Best Fit Line	0.00006
Angle of Best Fit Line:	0.00327
Maximum Angular Difference:	0.00115

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000
End 2:	
Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000
Maximum Angular Difference:	0.00000

Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00010	2.410	0.00004	0.002	YES
Diameter 2, in (rotated 90°)	0.00000	2.410	0.00000	0.000	YES
END 2					
Diameter 1, in	0.00020	2.410	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00000	2.410	0.00000	0.000	YES

Maximum angle of departure must be ≤ 0.25°

Perpendicularity Tolerance Met? **YES**

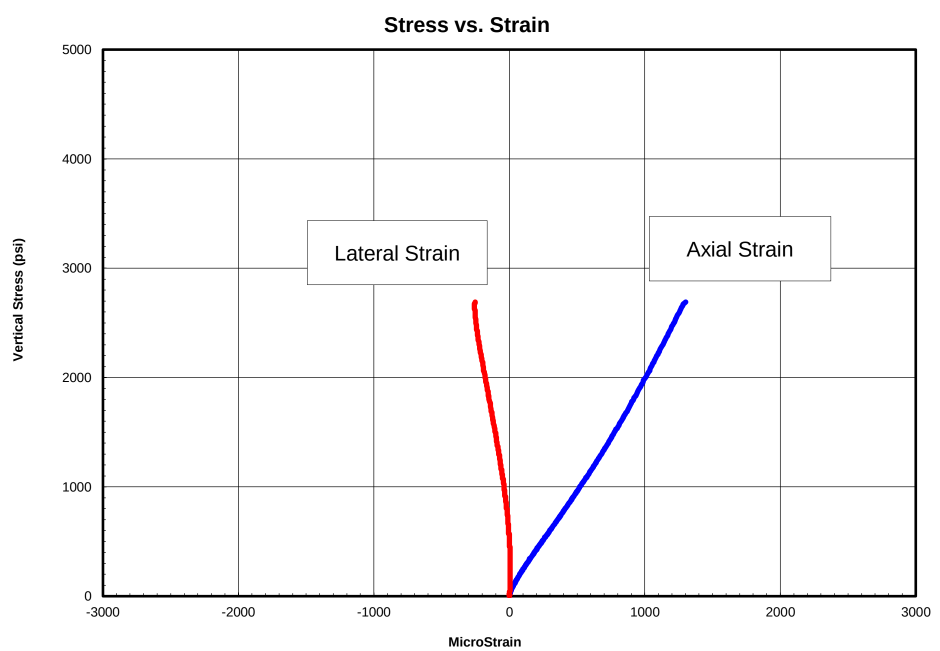
Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-11
Sample ID:	---
Depth, ft:	41.41-41.85

After cutting and grinding

After break

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	kdp
Checked By:	jsc
Boring ID:	LT-12
Sample ID:	---
Depth, ft:	31.93-32.37
Sample Type:	rock core
Sample Description:	See photographs Discontinuity failure

Compressive Strength and Elastic Moduli of Rock by ASTM D7012 - Method D



Peak Compressive Stress: 2,691 psi

Stress Range, psi	Young's Modulus, psi	Poisson's Ratio
300-1000	1,770,000	0.12
1000-1700	2,000,000	0.27
1700-2400	2,320,000	0.34

Notes:
Test specimen tested at the approximate as-received moisture content and at standard laboratory temperature.
The axial load was applied continuously at a stress rate that produced failure in a test time between 2 and 15 minutes.
Young's Modulus and Poisson's Ratio calculated using the tangent to the line in the stress range listed.
Calculations assume samples are isotropic, which is not necessarily the case.

Client:	Landslide Technology	Test Date:	12/27/2021
Project Name:	Haines Slide (Beach Rd)	Tested By:	ak
Project Location:	2930	Checked By:	smd
GTX #:	314747		
Boring ID:	LT-12		
Sample ID:	---		
Depth:	31.93-32.37 ft		
Visual Description:	See Photographs		

UNIT WEIGHT DETERMINATION AND DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543

BULK DENSITY

	1	2	Average		
Specimen Length, in:	5.27	5.26	5.27		
Specimen Diameter, in:	2.41	2.41	2.41		
Specimen Mass, g:	1329				
Bulk Density, lb/ft^3	210			**Minimum Diameter Tolerence Met?**	**YES**
Length to Diameter Ratio:	2.2			**Length to Diameter Ratio Tolerance Met?**	**YES**

DEVIATION FROM STRAIGHTNESS (Procedure S1)

Maximum gap between side of core and reference surface plate:
Is the maximum gap ≤ 0.02 in.? YES

Maximum difference must be < 0.020 in.
Straightness Tolerance Met? **YES**

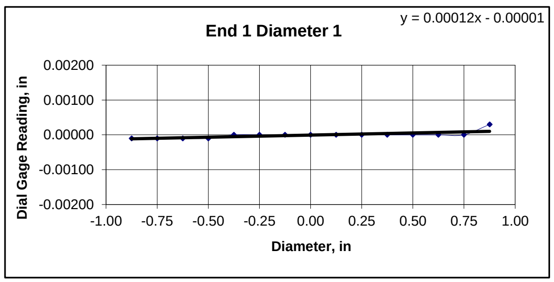
END FLATNESS AND PARALLELISM (Procedure FP1)

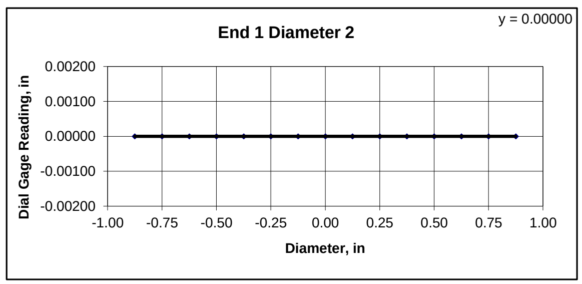
END 1	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00010	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00030
Diameter 2, in (rotated 90°)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

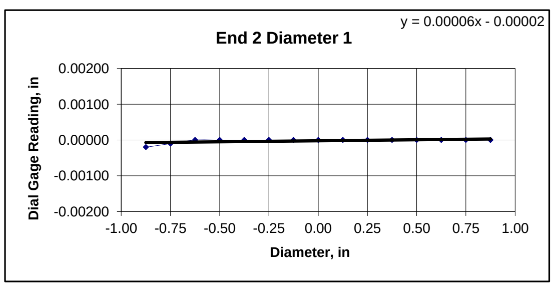
Difference between max and min readings, in:
0° = 0.00040 90° = 0.00000

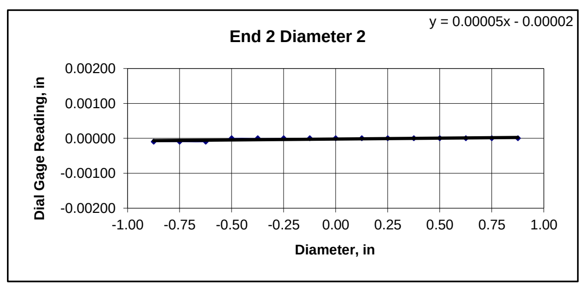
END 2	-0.875	-0.750	-0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in	-0.00020	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Diameter 2, in (rotated 90°)	-0.00010	-0.00010	-0.00010	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Difference between max and min readings, in:
0° = 0.0002 90° = 0.0001
Maximum difference must be < 0.0020 in. Difference = ± 0.00020
Flatness Tolerance Met? **YES**









DIAMETER 1

End 1:	
Slope of Best Fit Line	0.00012
Angle of Best Fit Line:	0.00704
End 2:	
Slope of Best Fit Line	0.00006
Angle of Best Fit Line:	0.00327
Maximum Angular Difference:	0.00377

Parallelism Tolerance Met? **YES**
Spherically Seated

DIAMETER 2

End 1:	
Slope of Best Fit Line	0.00000
Angle of Best Fit Line:	0.00000
End 2:	
Slope of Best Fit Line	0.00005
Angle of Best Fit Line:	0.00295
Maximum Angular Difference:	0.00295

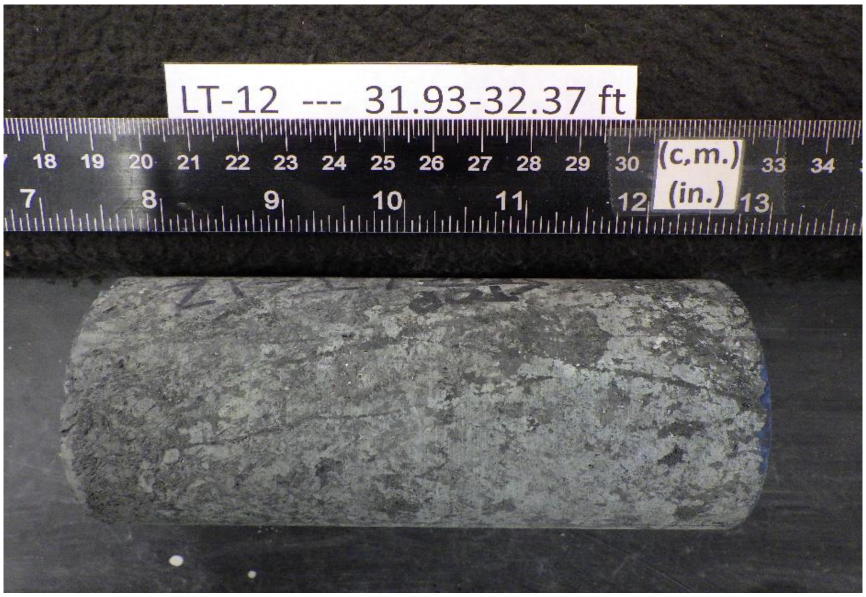
Parallelism Tolerance Met? **YES**
Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)

END 1	Difference, Maximum and Minimum (in.)	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?
Diameter 1, in	0.00040	2.410	0.00017	0.010	YES
Diameter 2, in (rotated 90°)	0.00000	2.410	0.00000	0.000	YES
END 2					
Diameter 1, in	0.00020	2.410	0.00008	0.005	YES
Diameter 2, in (rotated 90°)	0.00010	2.410	0.00004	0.002	YES

Maximum angle of departure must be ≤ 0.25°
Perpendicularity Tolerance Met? **YES**

Client:	Landslide Technology
Project Name:	Haines Slide (Beach Rd)
Project Location:	2930
GTX #:	314747
Test Date:	12/28/2021
Tested By:	ak
Checked By:	smd
Boring ID:	LT-12
Sample ID:	---
Depth, ft:	31.93-32.37



After cutting and grinding

After break

X-Ray Diffraction (XRD)

K/T GeoServices, Inc.

219 N. Iowa St., Unit J *www.ktgeo.com*
Gunnison CO 81230 USA *970-641-1235*

January 21, 2022

Jon Campbell
GeoTesting Express
125 Nagog Park
Acton MA 01720
(978) 635-0424
jcampbell@geotesting.com

GTX No.:	314747
Project	Haines Slide (Beach Rd), Location 2930
Subject:	X-ray Diffraction Analysis
K/T File No.:	Z21363

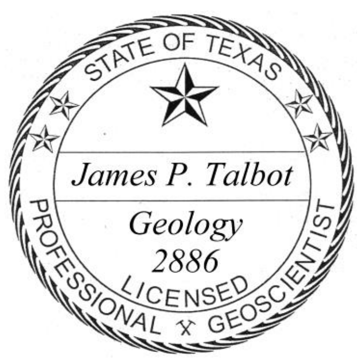
Dear Jon,

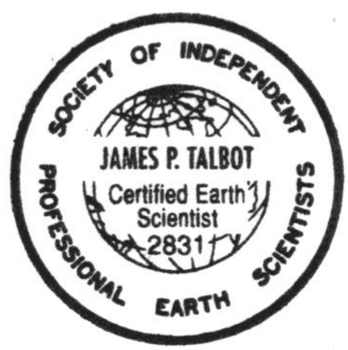
This report presents the results of Whole Rock X-ray diffraction (XRD) analysis. This analysis is performed to provide mineralogy of the samples.

Enclosed find the tabular XRD data (weight percentage), the X-ray diffraction traces and a description of sample preparation and analytical procedures. For your convenience, I have sent a copy of this report via e-mail.

If you have any questions concerning these results or if you need anything else please contact me at (970) 641-1235. Thank you for using K/T GeoServices to perform your X-ray diffraction analyses and I look forward to working with you again in the future.

Sincerely,





James P. Talbot, P.G.

X-ray Diffraction Data (Weight Percent)

Initial LT Desc.	Sample ID	Quartz	Plagioclase	Amphibole	Pyroxene	Biotite	Muscovite	Calcite	Total Clay Minerals*	Total
Ultramafic	LT-1, 53.64-53.73 ft	0.6	0	1.9	73.5	23.4	0	0	0.6	100
Felsic Vein	LT-1, 100.00-100.2 ft	0	27.1	4.6	35.5	0	21.9	0	10.9	100
Ultramafic	LT-3, 63.17-63.26 ft	0	3.6	17.4	54.8	22.5	0	0	1.7	100
Basalt/Ultramafic	LT-6, 24.00-24.71 ft	0	31.2	13	23.7	31.4	0	0	0.7	100
Basalt Dike	LT-7, 11.24-11.60 ft	24.1	48.5	0	3.5	0	15.9	0	8	100
Ultramafic	LT-8, 16.41-16.5 ft	0	0	18.9	61.6	17.2	0	0	2.3	100
Ultramafic	LT-8, 55.20-55.83 ft	1.3	63.7	6.3	6.2	16	0	5.9	0.6	100
Ultramafic	LT-9, 93.67-93.9 ft	0	0	13.7	81.5	0	3.8	0	1	100
Ultramafic	LT-11, 28.58-28.67 ft	0	0	58.3	0	18	0	20.4	3.3	100

*Total Clay Minerals - +/- Illite&Mica, Mixed-Layer Clay Minerals, Chlorite, and Kaolinite.

See page 3 for mineral definitions.
See page 4 for a discussion of X-ray diffraction terminology and limitations.
Sample preparation and analytical procedures are on page 5.
X-ray diffraction traces are presented at the end of the report.

Rock Forming (nonclay) Minerals

Quartz

Quartz (SiO_2) is the most common rock-forming mineral.

Plagioclase

Plagioclase is a mineral series ranging in composition from Albite ($NaAlSi_3O_8$) to Anorthite ($CaAl_2Si_2O_8$) and is one of the most common rock forming mineral groups.

Amphibole

The term amphibole refers to a mineral group. Hornblende is a common member of this group.

Pyroxene

Pyroxene refers to an important group of ferromagnesium silicates that occur in almost every type of igneous rock. Calcium pyroxenes such as augite have the general formula $(Ca,Mg,Fe^{2+},Al)_2 (Si,Al)_2O_2$.

Biotite

Biotite is a common rock forming mineral that is a member of the mica group. It is black in hand specimen and brown to green in thin section. Biotite has the general formula $K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$.

Calcite

Calcite is a common hexagonal carbonate mineral with the formula $CaCO_3$.

Phyllosilicate (Clay) Minerals

Mixed-Layer Clay Minerals

Clay mineral groups commonly containing Illite or Chlorite interlayered or interstratified with Smectite. The mixed-layer clay type is identified by the minerals involved, the type of order or stacking along the Z axis and the proportions of the minerals involved.

Illite & Mica

Illite & Mica (muscovite) are common non-expanding (non-swelling) minerals. Illite is the fine-grained clay mineral analogue to muscovite. Illite and Mica are hydrated silicates containing potassium, silica and alumina.

Kaolinite

Kaolinite is a common non-expanding (non-swelling) clay mineral. It is a hydrous aluminum silicate with the general formula $Al_2(Si_2O_5)(OH)_4$.

Chlorite

Chlorite is a common non-expanding (non-swelling) clay mineral. It is a hydrous aluminum silicate that often contains iron.

Reference for general mineral definitions: Dictionary of Geological Terms, American Geological Institute, 1976, Anchor Press/Doubleday, Garden City, New York.

K/T GeoServices, Inc.
XRD1 - Bulk Only XRD Analysis
Discussion of Terminology and Limitations

Weight percentage data from X-ray diffraction methods are considered semi-quantitative; there are many factors affecting the results.

XRD methods can quantify crystalline material only. Non-crystalline material in large concentrations can be detected but not quantified. Therefore, any non-crystalline material is not included in the accompanying results.

Detection limits for XRD are on the order of <1 to 5 weight percent. Detection limits differ for each mineral species.

Mineral standards used to determine calibration factors are often different from the actual minerals analyzed. Minerals such as feldspars that undergo solid solution are especially problematic. Clay minerals are problematic for this same reason. Clay minerals also have a wide range of crystallinities (poorly crystallized to well crystallized) which may compound this problem.

With this method the data always sums to 100%. This means that the percentages reported for each mineral are dependent upon the percentages reported for the other minerals. If one mineral is underestimated the others will be overestimated. Also, if one or more minerals are present but not detected then the percentages of the minerals that are detected will be overestimated.

Any or all of the above factors may affect the estimated weight percentages.

K/T GeoServices, Inc.
XRD1 - Bulk Only XRD Analysis
Sample Preparation and Analytical Procedures

Sample Preparation

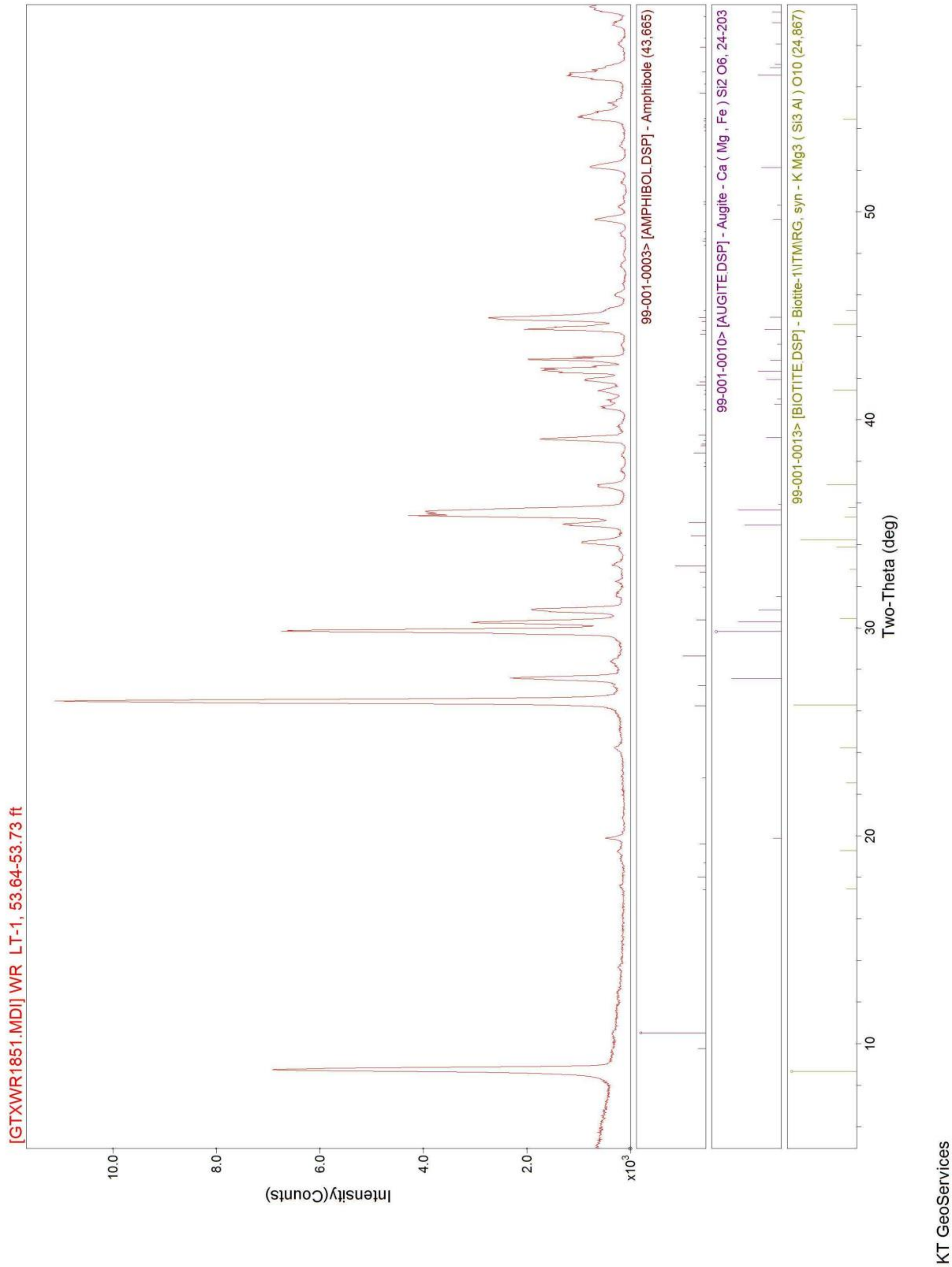
Samples submitted for bulk XRD analyses are cleaned of obvious contaminants and disaggregated in a mortar and pestle. A split of the sample is then transferred to distilled water and pulverized using a McCrone micronizing mill. The resultant powder is dried, disaggregated, and packed into a metal sample holder to produce random bulk mounts.

Analytical Procedures

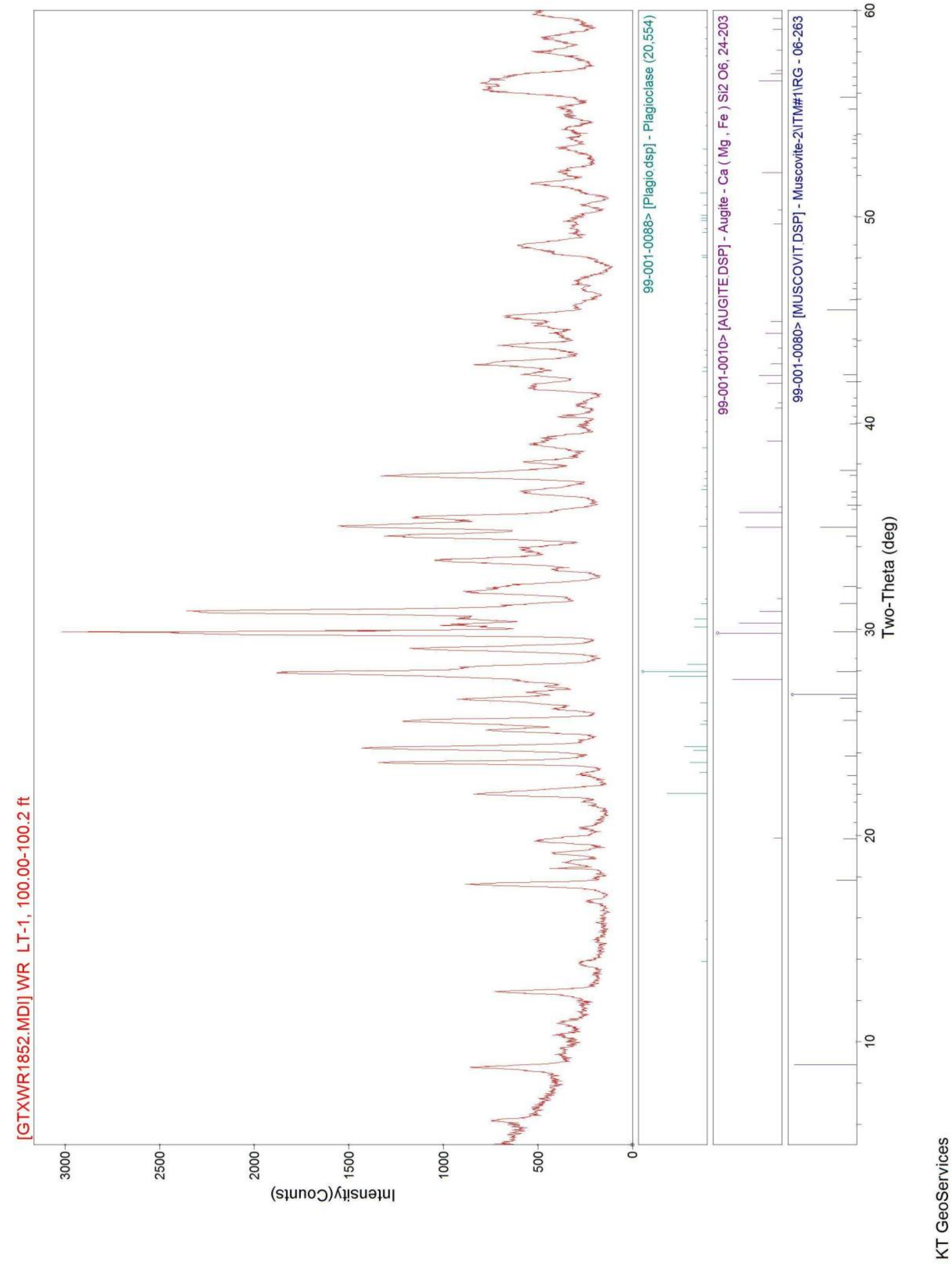
X-ray Diffraction (XRD) analyses of the samples are performed using a Siemens D500 automated powder diffractometer equipped with a copper X-ray source (40kV, 30mA) and a scintillation X-ray detector. The bulk powder samples are analyzed over an angular range of five to sixty degrees two theta at a scan rate of one degree per minute.

Semiquantitative determinations of bulk powder mineral amounts are done using Jade Software (Materials Data, Inc.) with the Whole Pattern Fitting option. All quantitative data (including an estimate of clay mineral amounts) come from the bulk powder pattern. This is done by using Whole Pattern Fitting (WPF) and Rietveld refinement methods on the observed data. A diffraction model is fit to the measured pattern by non-linear least-square optimization in which certain parameters are varied to improve the fit of the model to the observed data. Modeling parameters include background, profile parameters, and lattice constants. For Rietveld refinement, a complete physics simulation is generally used in which crystal structures of the phases are required. Since the physics of scattering is well known, this method can be very exact and even allow adjustment of atomic coordinates, occupancies, and thermal parameters.

Whole Rock X-ray Diffraction Trace



Whole Rock X-ray Diffraction Trace



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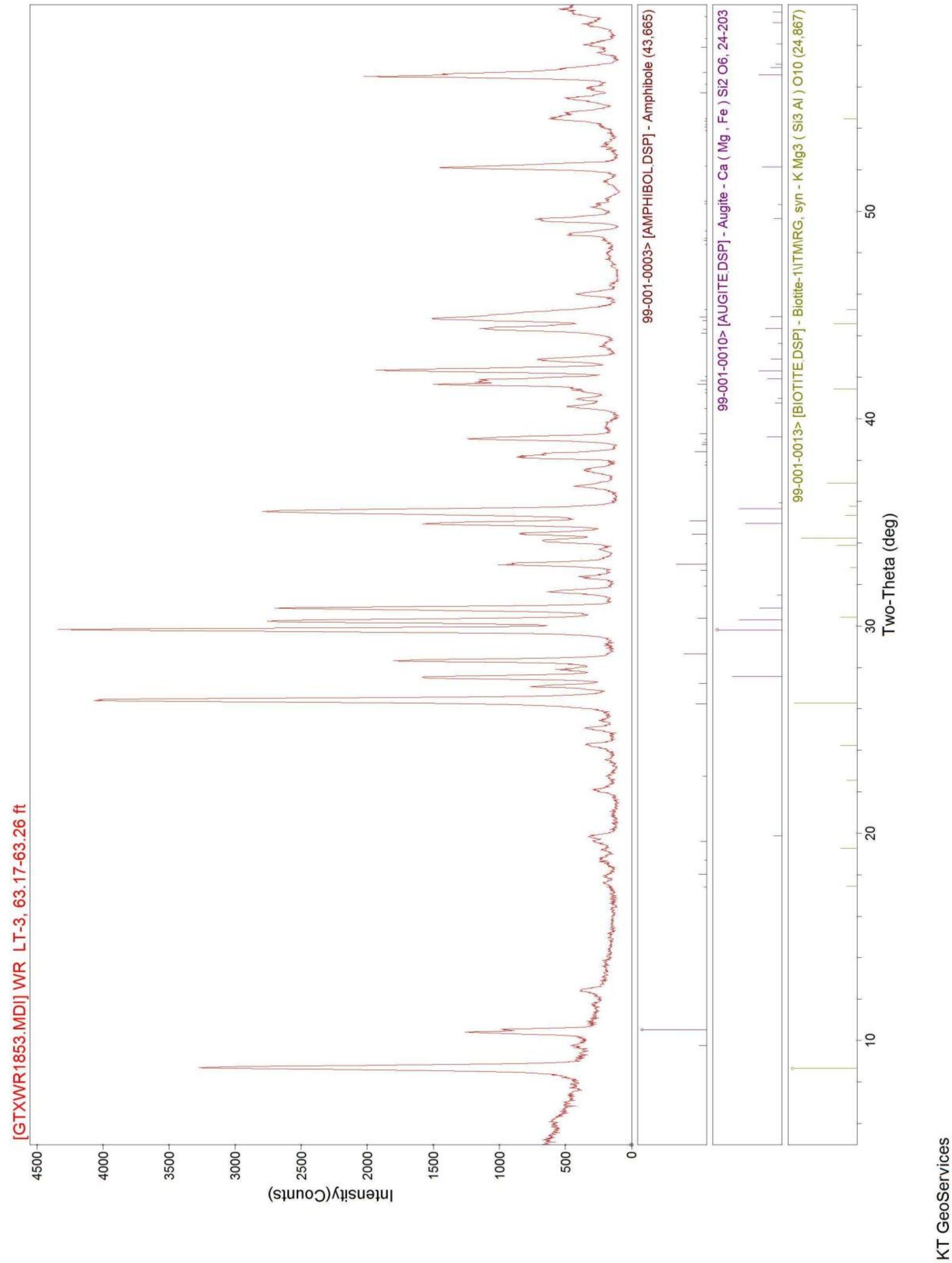

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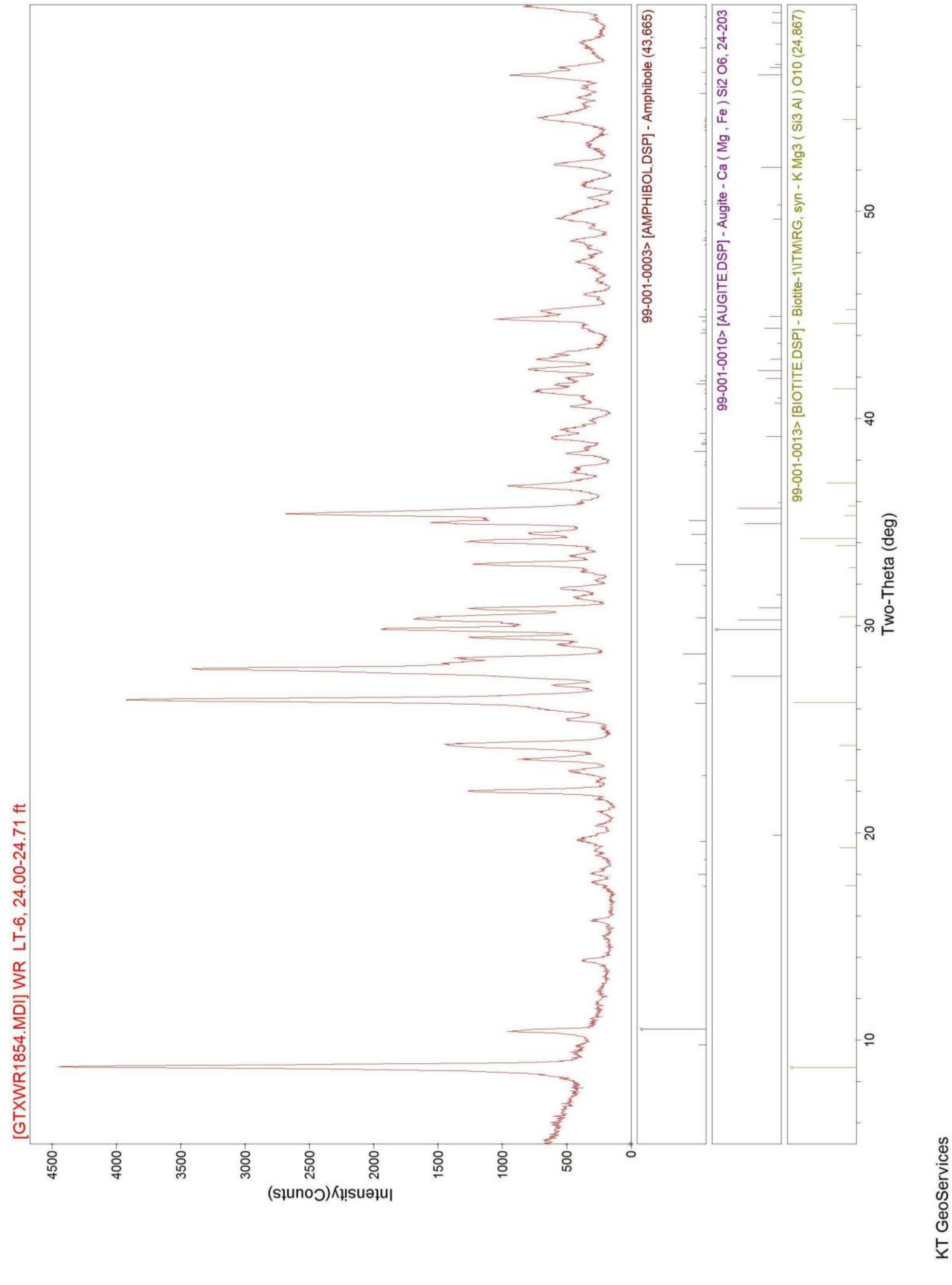

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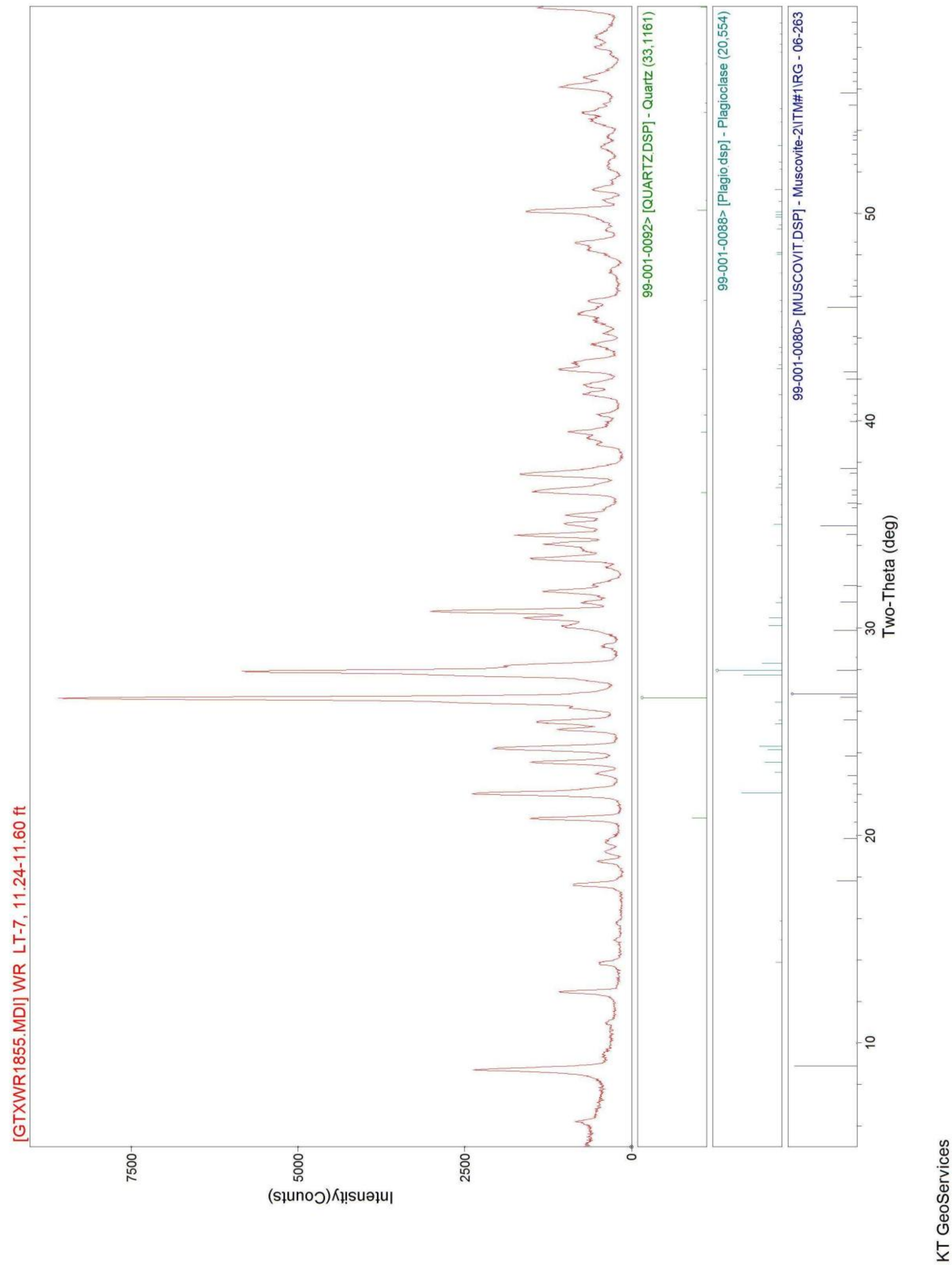
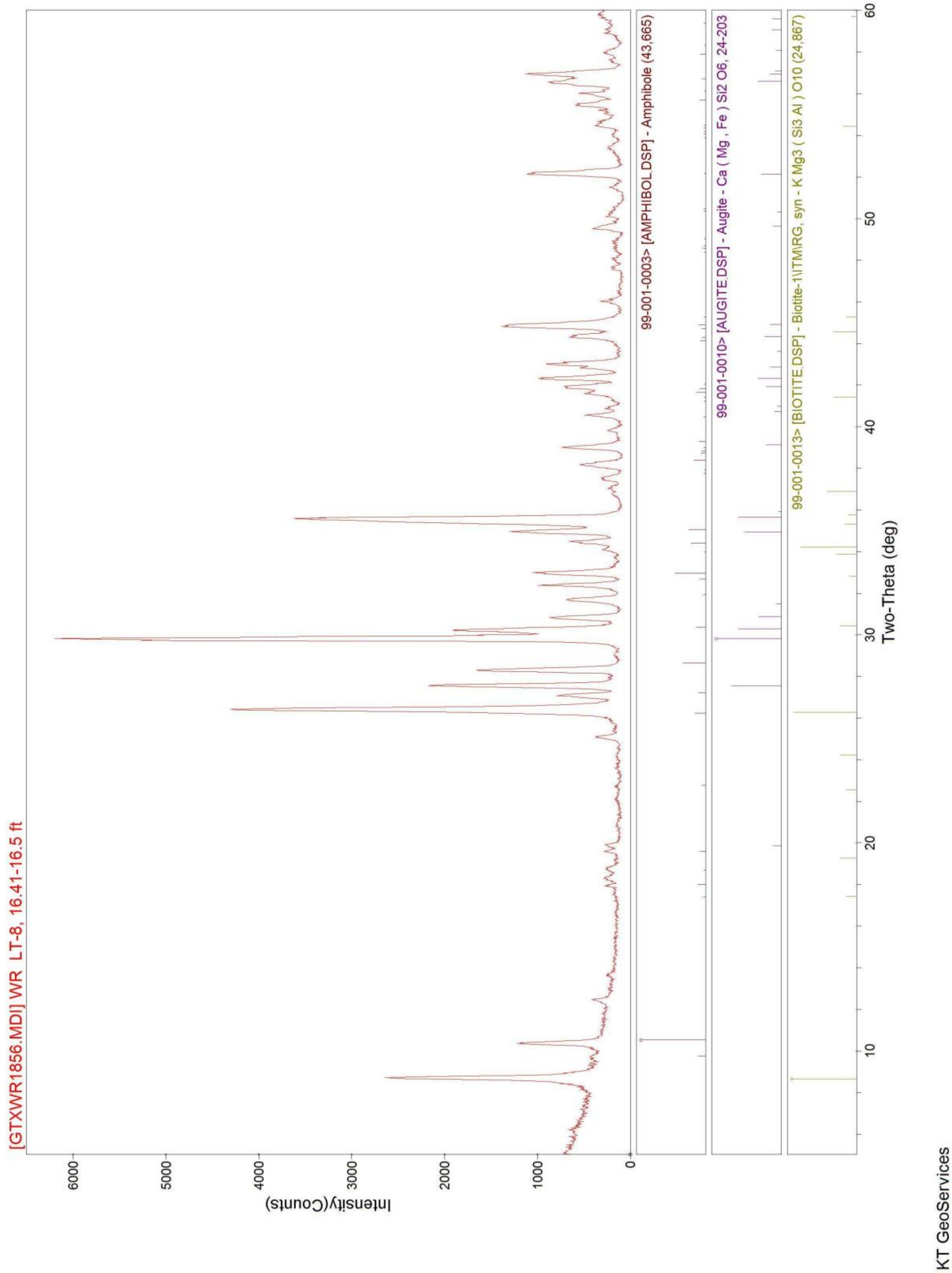
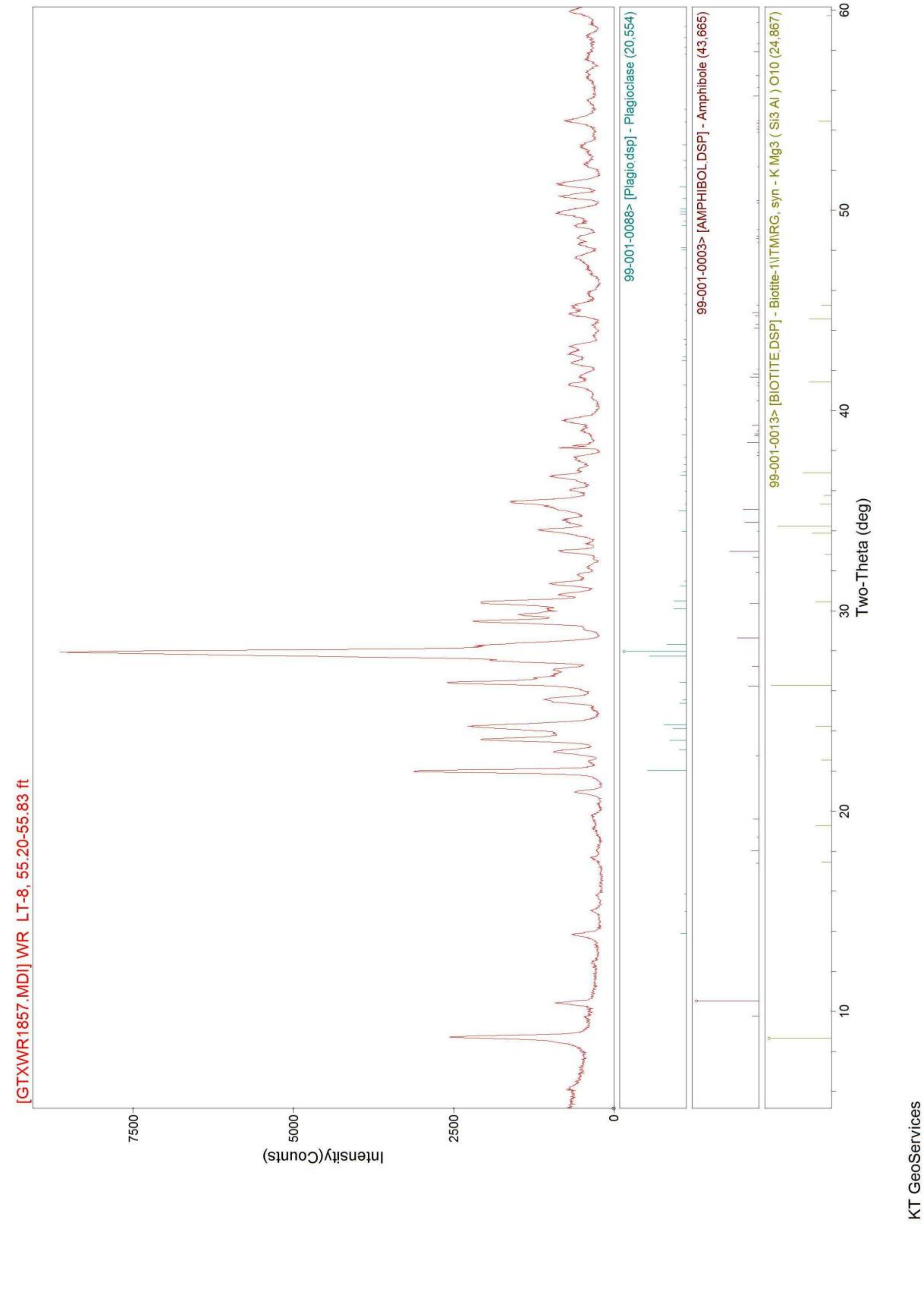


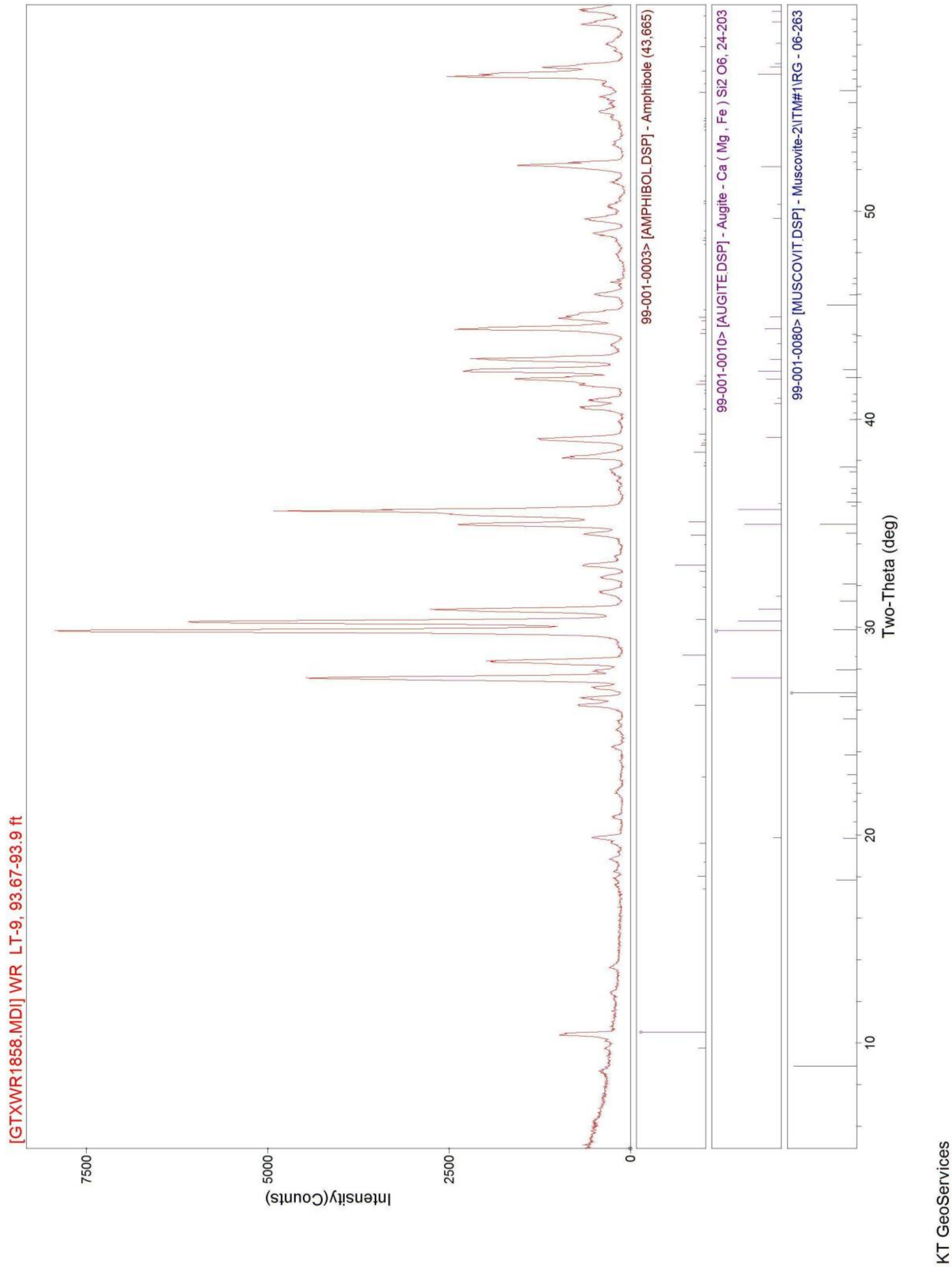
Whole Rock X-ray Diffraction Trace



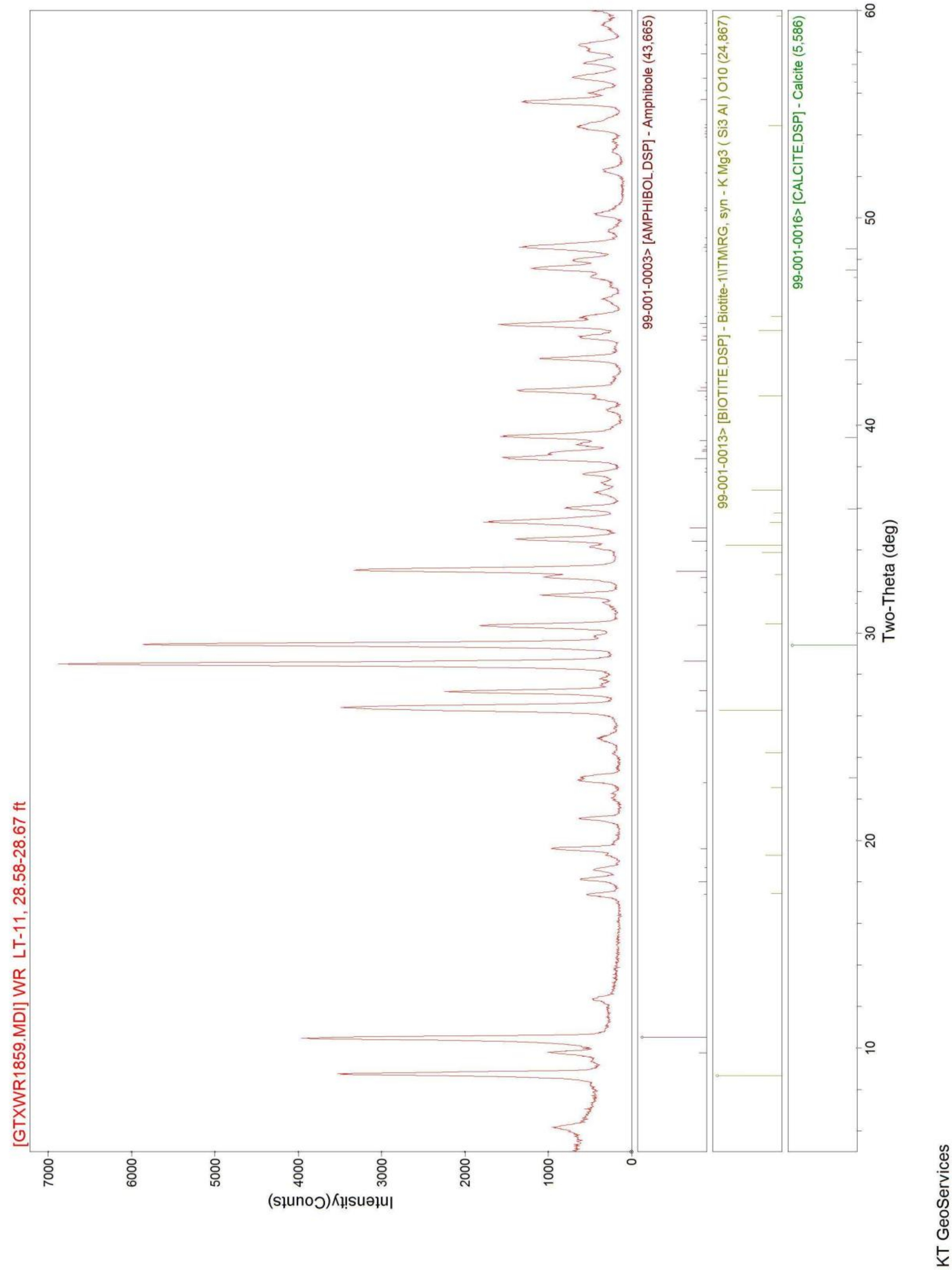
Whole Rock X-ray Diffraction Trace



Whole Rock X-ray Diffraction Trace



Whole Rock X-ray Diffraction Trace



Petrographic Analysis

Petrographic Analysis of Selected Igneous Rock Thin Sections Landslide Technology – Haines Slide (Beach Rd)

Prepared for:

Brent Duncan
Earth Mechanic Institute, Department of Mining Engineering
Colorado School of Mines

Prepared by:

Ryan McLin
McLin Petrographics

Table of Contents

PETROGRAPHIC ANALYSIS

1. Introduction

The following report includes an assessment of rock type, mineralogy, and notable textural features. Rock type descriptions are accompanied by thin section photomicrographs and include five images of each sample in both plane-polarized light and crossed-polarized light and range in magnification from 2.5x, 5x, 10x, 20x, and 50x. Larger scale textural features are captured at low magnification, whereas details of the mineral matrix are characterized at the medium and high magnifications. Table 1 lists sample ID, rock type, the type of analysis performed, and a listing of the thin section images for further reference. Analytical procedures are described at the end of this report.

2. Rock Type

The igneous and sedimentary rock type designation of the samples shown in Table 1 are named according to the QAPF Classification of igneous rocks (IUGS Subcommission on the Systematics of Igneous Rocks - Streckeisen 1974; La Maitre 2002) based upon observation in thin section and in hand sample.

Table 1. Petrologic Testing Matrix

Sample ID	Rock Type	Thin Section	Images
LT-1, 53.64-53.73 ft	Clinopyroxenite	X	1-10
LT-1, 99.9-99.99 ft	Gabbro (heavily altered)	X	11-20
LT-3, 63.17-63.26 ft	Clinopyroxenite	X	21-30
LT-6, 24.72-24.8 ft	Alkaline Lamprophyre	X	31-40
LT-7, 11.13-11.22 ft	Alkaline Lamprophyre	X	41-50
LT-8, 16.41-16.5 ft	Olivine Gabbro	X	51-60
LT-8, 55.85-55.94 ft	Dolerite or Diabase	X	61-70
LT-9, 93.48-93.56 ft	Clinopyroxenite	X	71-80
LT-11, 28.58-28.67 ft	Clinopyroxenite	X	81-90
	TOTAL	**9**	

2.1. Clinopyroxenite

Megascopic Description: Samples LT-1 (53.64-53.73 ft), LT3 (63.17-63.26 ft), LT-9 (93.48-93.56 ft), and LT-11 (28.58-28.67 ft) are very dense, hard, dark gray to black in color, phaneritic, and coarsely-crystalline igneous rocks composed of clinopyroxene, biotite/phlogopite, hornblende, plagioclase feldspar, olivine, and magnetite.

Microscopic Description: Clinopyroxenite is an ultramafic igneous intrusive rock that is dark gray to black in color and phaneritic in texture. The minerology is dominated by coarsely-crystalline phenocrysts of augite-clinopyroxene, with medium-to-finely-crystalline biotite/phlogopite, olivine, hornblende, plagioclase feldspar, and opaque magnetite (e.g., Thin Section Images 1-10, 21-30, and 71-90). The augite-clinopyroxene exhibits high relief, is colorless and pleochroic to pale green and yellow, has two good cleavages at 87 and 93 degrees and exhibits maximum interference colors to middle second-order pale-yellow to bright blue, green, purple, and red under cross-polarized light. Fine-to-medium-crystalline biotite and/or phlogopite are common in the LT-1, LT-3, and LT-7 samples. Biotite exhibits moderate relief, has one excellent cleavage, is pleochroic, and has strong interference colors that can range up to second-order red. Flakes that are lying on cleavage show very low-order colors. Fine-to-medium-crystalline hornblende is common in Samples LT-3 and LT-9 and rim fine-to-medium crystalline plagiolcase and oligoclase feldspar vein-fill. Hornblende exhibits a deep green color and is pleochroic, a characteristic amphibole cleavage of 56 and 124 degrees and is of moderate to high-relief. In hand sample, the hornblende is indicated by long, prismatic crystals. Fine-to-medium-crystalline olivine phenocrysts are common in Sample LT-11. Olivine is of high-relief, exhibits upper second-order interference colors that are very vibrant and is normally anhedral. Magnetite is common throughout all samples, is opaque, variable in size from fine-to-medium-crystalline and is especially common in Sample LT-11 as fracture or alteration fill after augite-clinopyroxene. Serpentine is a common alteration mineral after clinopyroxene and is colorless to pale-green in color and shows dark gray first-order interference colors. Serpentine is most common in Sample LT-11.

2.2. Gabbro & Olivine Gabbro

Megascopic Description: The gabbro sample LT-1 (99.9-99.99 ft) and olivine gabbro sample LT-8 (16.41-16.5 ft) are mafic igneous intrusive rocks that are very dense, hard, and variable in color from dark green and medium-gray to light gray and dark black. The rocks are phaneritic and fine-to-medium-crystalline with black, white, pink, and green phenocrysts visible. The LT-1 gabbro is heavily altered and appears to have a layered texture, possibly of a layered intrusion such as a pyroxene-plagiolcase orthocumulate. The olivine gabbro (LT-8) includes calcic plagiolcase, orthoclase, and minor calcite in white veins through the hand sample. Minerology is dominated by feldspar, olivine, and clinopyroxene with secondary alteration minerals common.

Microscopic Description: The gabbro is a mafic igneous intrusive rock that is variable in color from dark green to light and medium gray and dark black. The mineralogy is dominated by augite-clinopyroxene and feldspar, with subordinate amounts of olivine, magnetite, hornblende, biotite/phlogopite, and rare nepheline (e.g., Thin Section Images 51-60). Alteration minerals are quite common such as serpentine, chlorite, sericite, calcite, and amphibole minerals such as uralite. In Sample LT-1, alteration minerals replace most of the primary minerology (e.g., Thin Section Images 11-18). Augite-clinopyroxene is most common and shows high relief, is colorless and pleochroic to pale green and yellow, has two good cleavages at 87 and 93 degrees, and exhibits maximum interference colors to middle second-order under crossed-polarized light. The feldspar is composed primarily of albite plagiolcase exhibiting first-order white and gray interference colors and has a unique polysynthetic twinning giving a striped appearance under cross-polarized light. Portions of the plagiolcase feldspar are altered to sericite, which is chemically identical to muscovite mica. Sericite is particularly common in Sample LT-1 (e.g., Thin Section Images 11-20).

2.3. Dolerite or Diabase

Megascopic Description: Sample LT-8 (55.85-55.94 ft) is very dense, hard, dark gray in color, phaneritic, and finely-crystalline igneous rock with white and black phenocrysts composed of feldspar, augite-clinopyroxene, and hornblende.

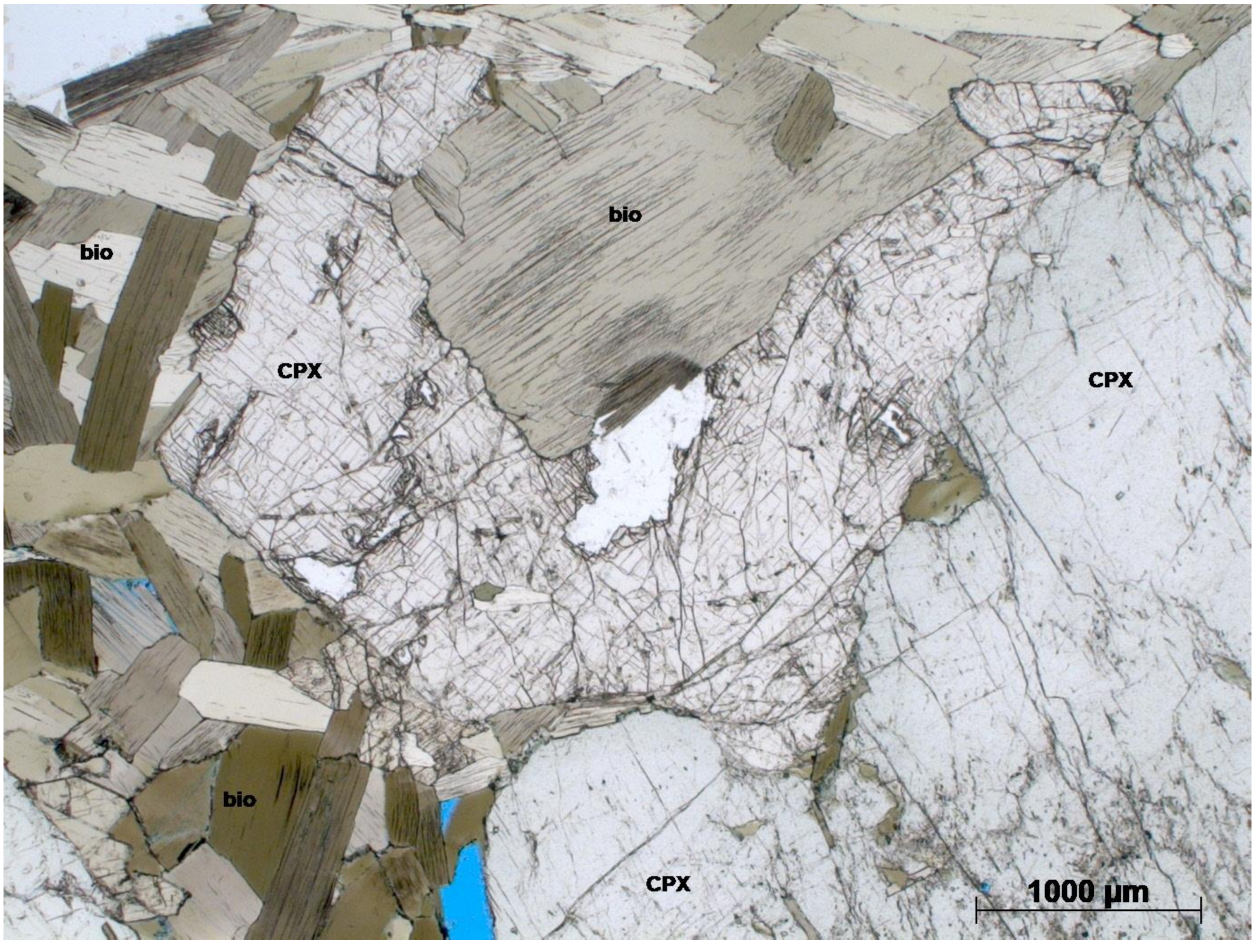
Microscopic Description: The dolerite is identical in composition to the gabbro but exhibits a smaller crystal size of medium-to-finely-crystalline with a phaneritic texture. The minerology is dominated by finely-crystalline phenocrysts of plagioclase feldspar, augite-clinopyroxene, olivine, hornblende, biotite, with minor opaque magnetite and replacive calcite. White to colorless plagiolcase feldspar exhibits an ophitic texture in the dolerite that is typically wrapped in augite. (e.g., Thin Section Images 61-70). The plagiolcase shows low, first order gray to white interference colors and has characteristic polysynthetic twinning. Sericite frequently replaces the plagiolcase feldspar. Hornblende is moderately abundant, pleochroic, pale green to yellow in color, is of moderate to high-relief, and exhibits stubby, prismatic crystals with a characteristic amphibole cleavage of 56 and 124 degrees. The augite-clinopyroxene exhibits high relief, is colorless and pleochroic to pale green and yellow, has two good cleavages at 87 and 93 degrees and exhibits maximum interference colors to middle second-order pale-yellow to bright blue, green, purple, and red under cross-polarized light. Serpentine typically replaces augite-clinopyroxene and olivine and is colorless to pale-green in color and shows dark gray first-order interference colors.

2.4. Alkaline Lamprophyre

Megascopic Description: Samples LT-6 (24.72-24.8 ft) and LT-7 (11.13-11.22 ft) are dense, hard, dark gray, phaneritic, and finely-crystalline. Sample LT-6 includes white calcite veins. Minerology for both samples is dominated by finely-crystalline phenocrysts of plagiolcase feldspar and augite-clinopyroxene.

Microscopic Description: The alkaline lamprophyre samples closely resemble camptonites, which are alkaline igneous rocks that are dominated by plagioclase, augite-clinopyroxene, and hornblende. The minerology is dominated by finely-crystalline phenocrysts of lath-like or zoned plagiolcase feldspar and augite-clinopyroxene, with subordinate hornblende, biotite, and magnetite. Minor secondary alteration minerals include sericite after plagiolcase feldspar, as well as serpentine, chlorite, and calcite after augite-clinopyroxene. (e.g., Thin Section Images 33-38 and 43-50). The plagiolcase feldspar exhibits common polysynthetic twinning and low, first-order interference colors of white and gray. Like the gabbro and dolerite/diabase samples, the lamprophyre samples include variably abundant veins that are filled with calcite.

3. Thin Section Images

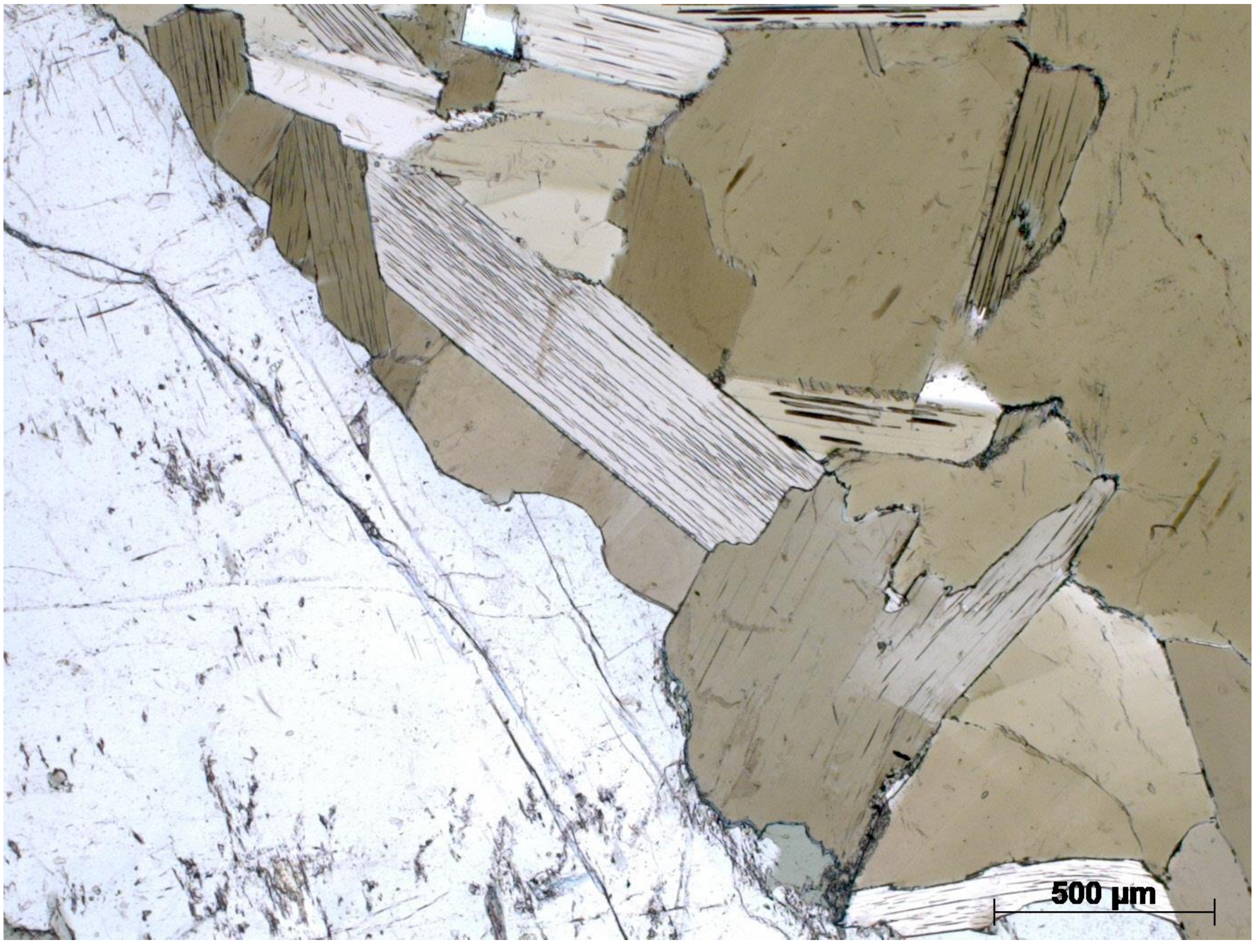


LT-1_53_64-53_73_2_5x_ppl_001	Clinopyroxenite

Thin Section Image 01. Clinopyroxenite at low magnification exhibits a variety of fine-to-medium-grained biotite and phlogopite (bio) and coarse-grained augite-clinopyroxene (CPX) bound in a phaneritic framework. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.

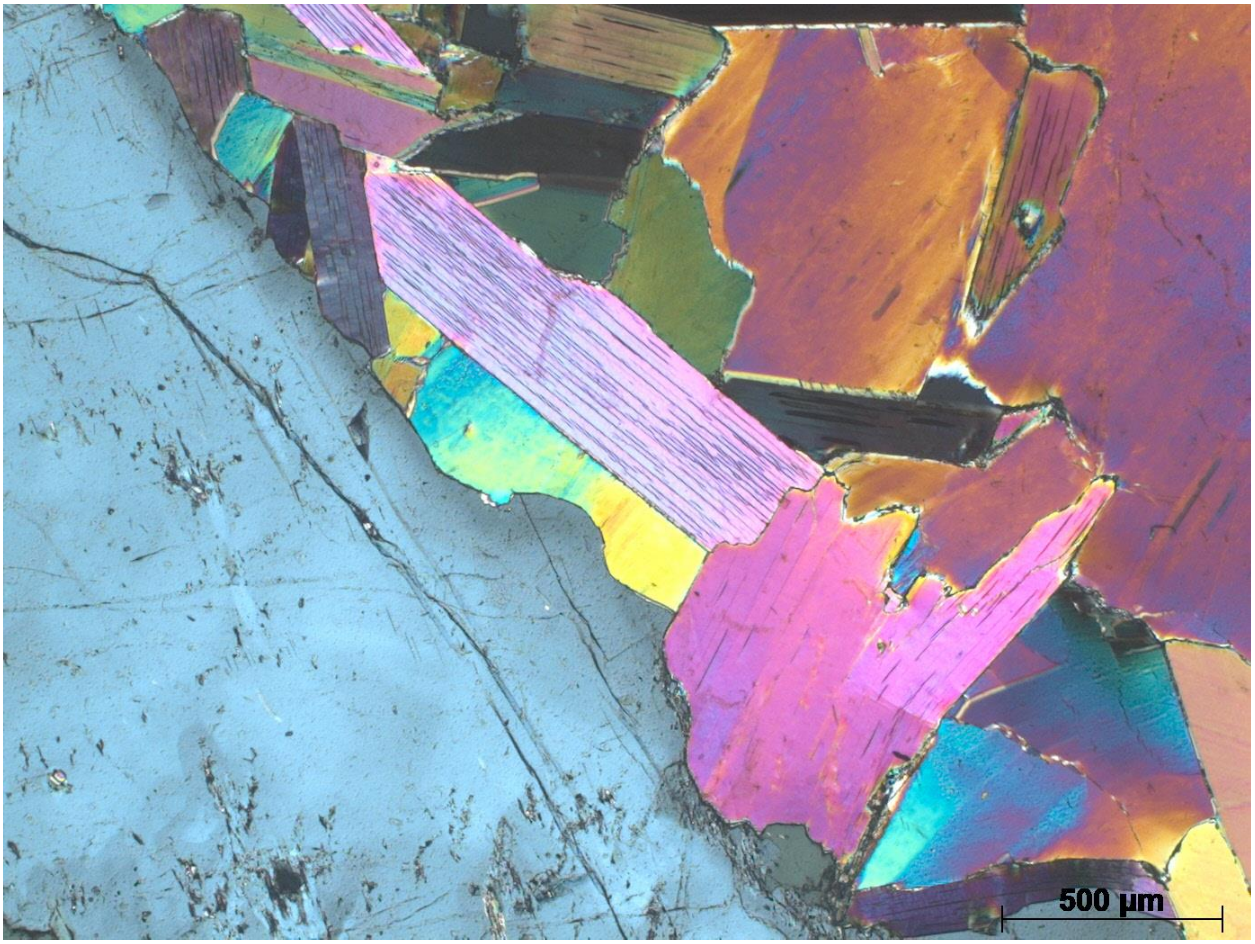
LT-1_53_64-53_73_2_5x_xpl_002	Clinopyroxenite

Thin Section Image 02. The same photo of the clinopyroxenite as thin section image 01 but taken under crossed polarized light illustrates the strong, second-order interference colors of the biotite/phlogopite, the higher-relief of the augite at center, and the undulatory compositional zoning of the augite at lower-right. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



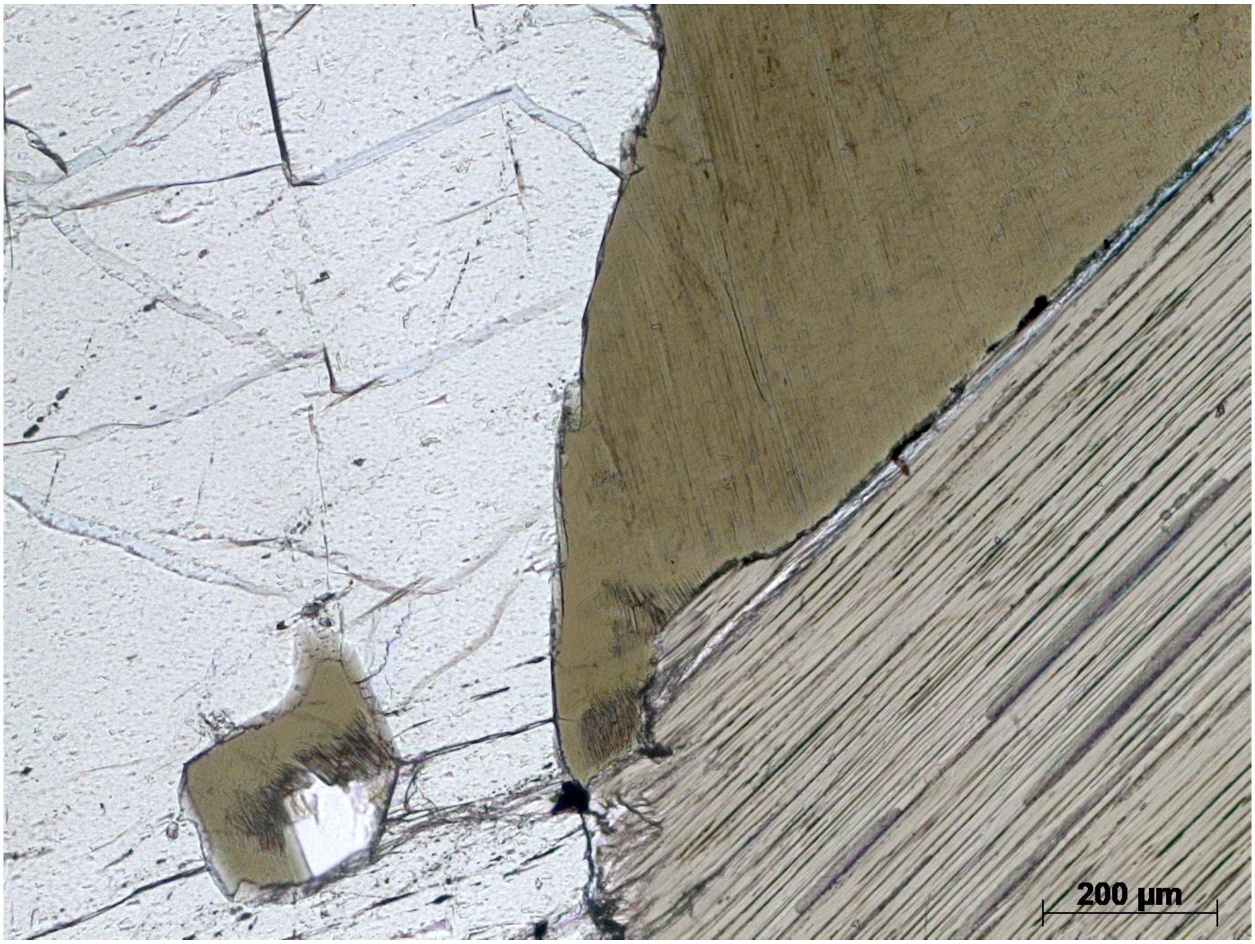
LT-1_53_64-53_73_5x_ppl_003	Clinopyroxenite

Thin Section Image 03. More magnified view of the clinopyroxenite reveals fine-to-medium crystalline biotite/phlogopite at upper-right that appears pale to dark-green, is pleochroic, and shows one good cleavage. The augite-clinopyroxene at lower-left is colorless and exhibits a near 90-degree cleavage. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



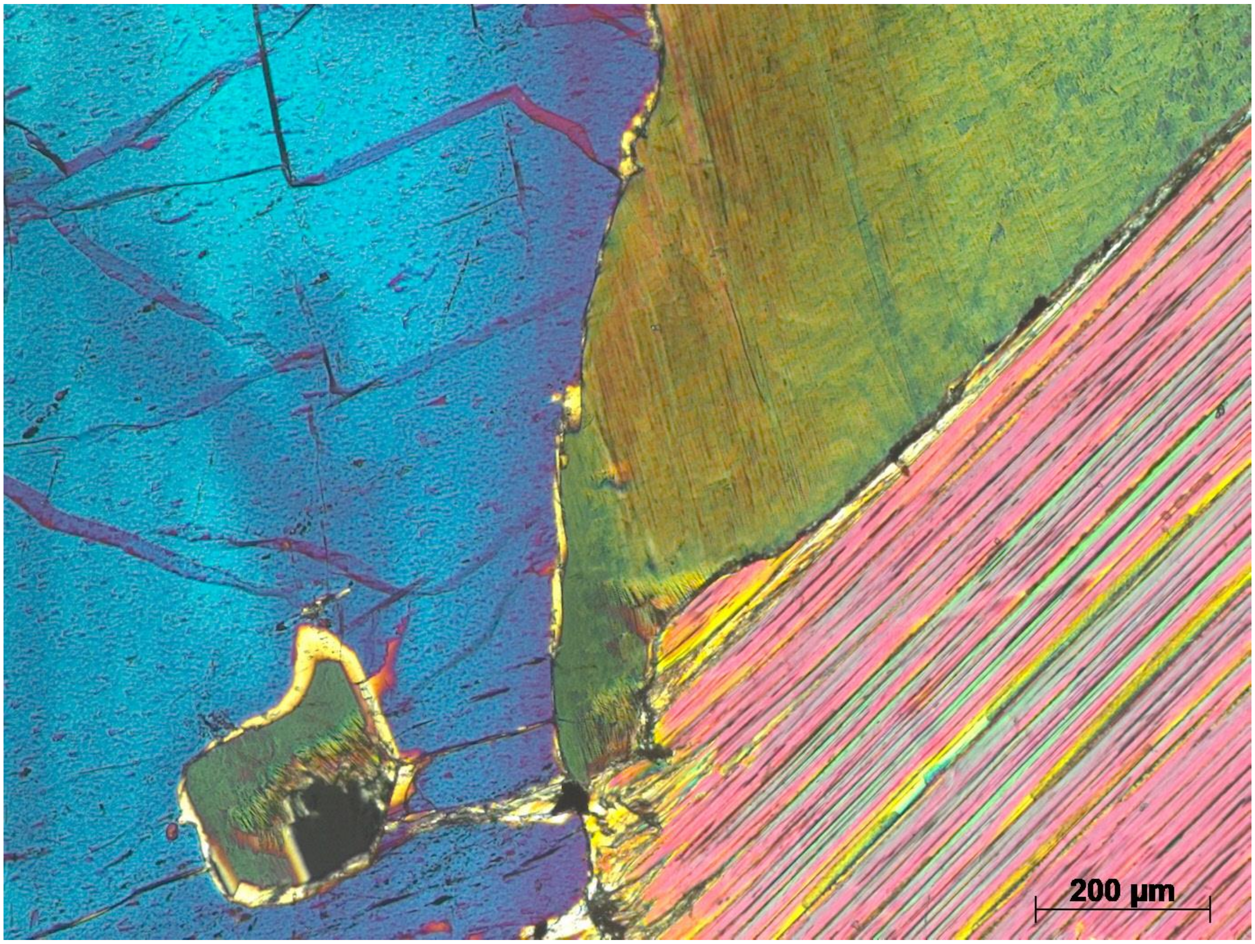
LT-1_53_64-53_73_5x_xpl_004	Clinopyroxenite

Thin Section Image 04. The same image as thin section image 03 but taken under crossed-polarized light reveals bright, second-order interference colors of the biotite/phlogopite. The augite-clinopyroxene is colorless with low interference colors in this crystal orientation. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



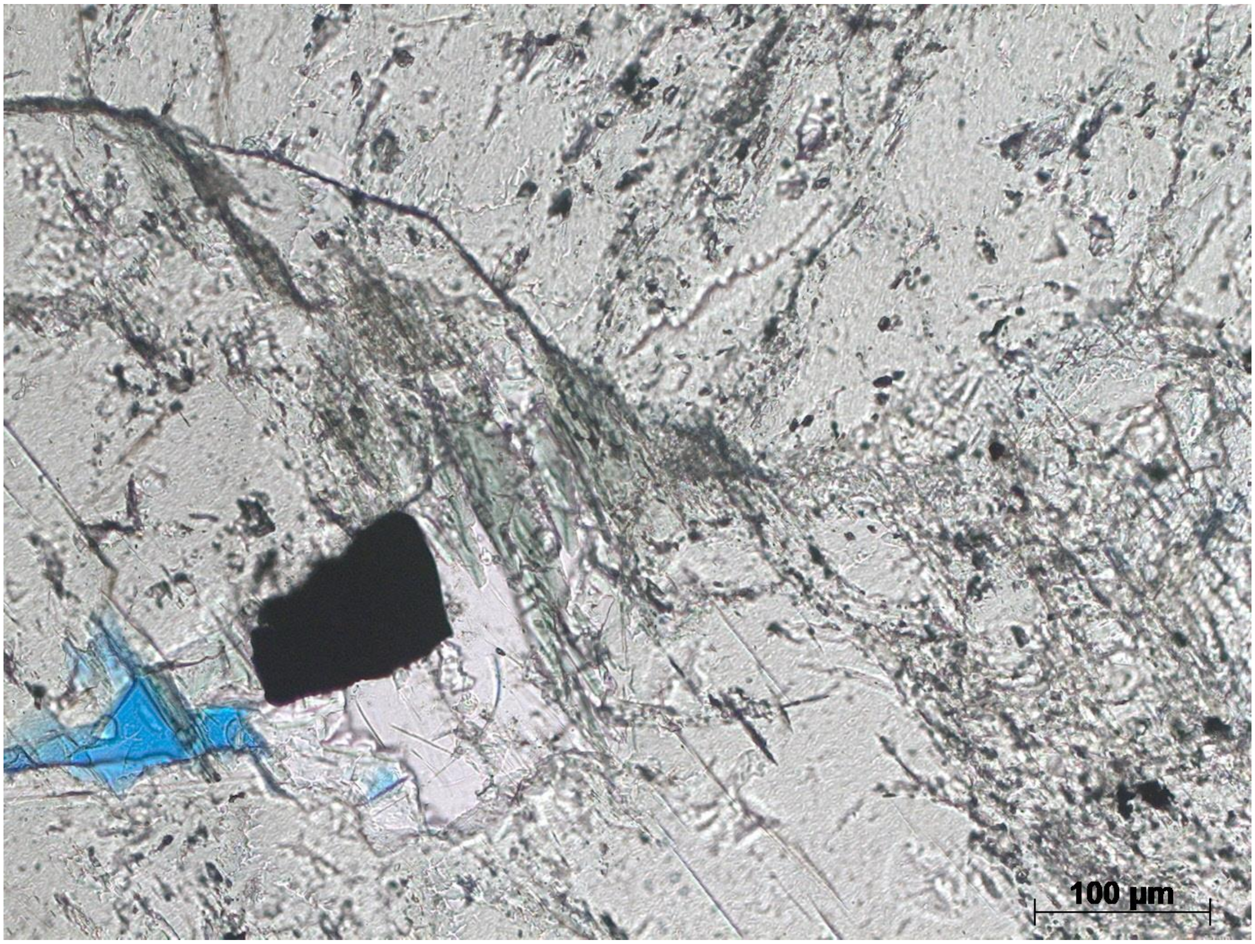
LT-1_53_64-53_73_10x_ppl_005	Clinopyroxenite

Thin Section Image 05. Higher magnification view of the clinopyroxenite shows high-relief, pleochroic biotite/phlogopite at right with pale to dark green coloring. At left, is moderate-to-high-relief augite clinopyroxene exhibiting two good cleavages at near 90-degrees. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



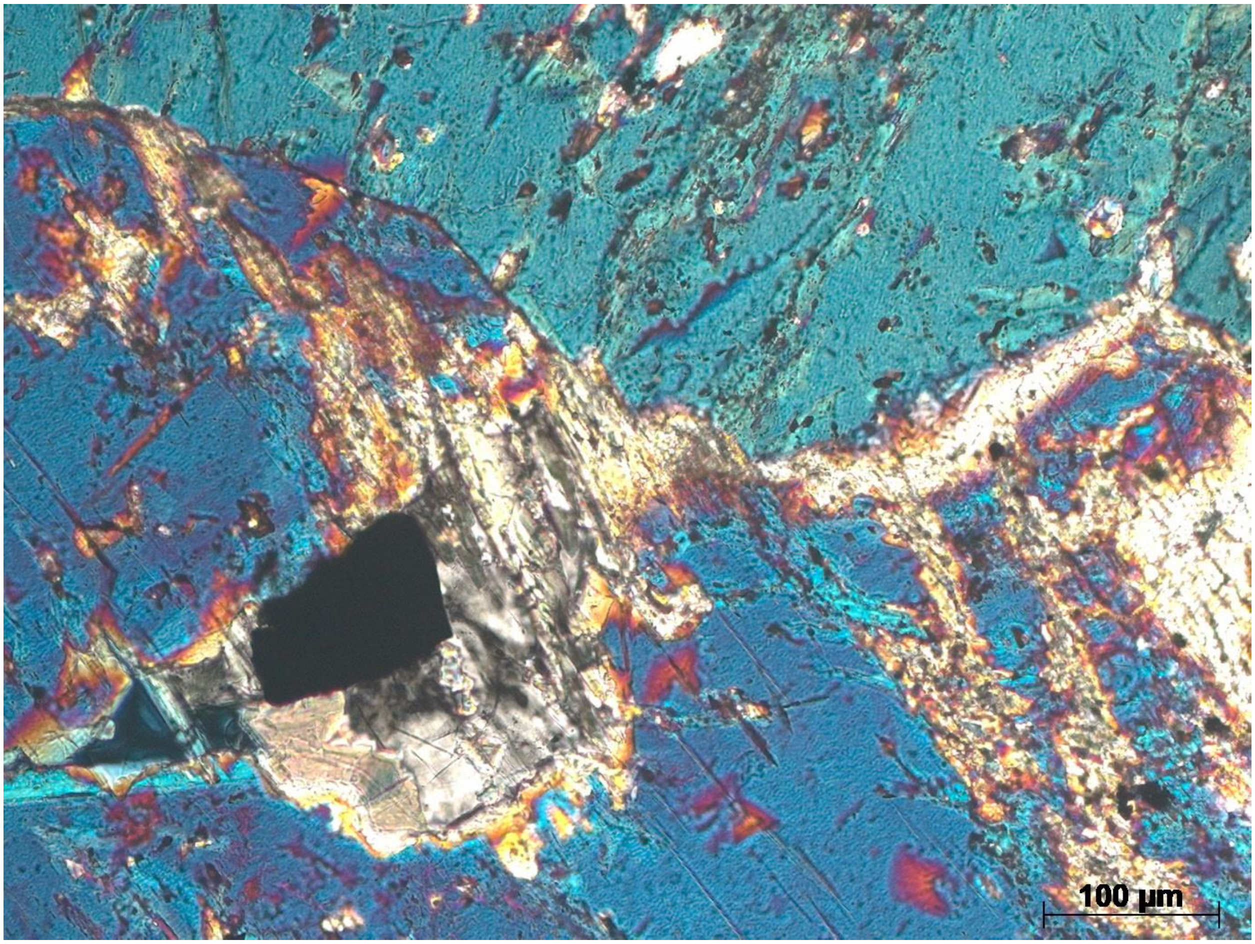
LT-1_53_64-53_73_10x_xpl_006	Clinopyroxenite

Thin Section Image 06. The same view as in thin section image 05 but taken under crossed-polarized light to emphasize the high, second-order green, pink, and yellow interference colors of the biotite/phlogopite and middle, second-order blue and purple interference colors of the augite-clinopyroxene. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



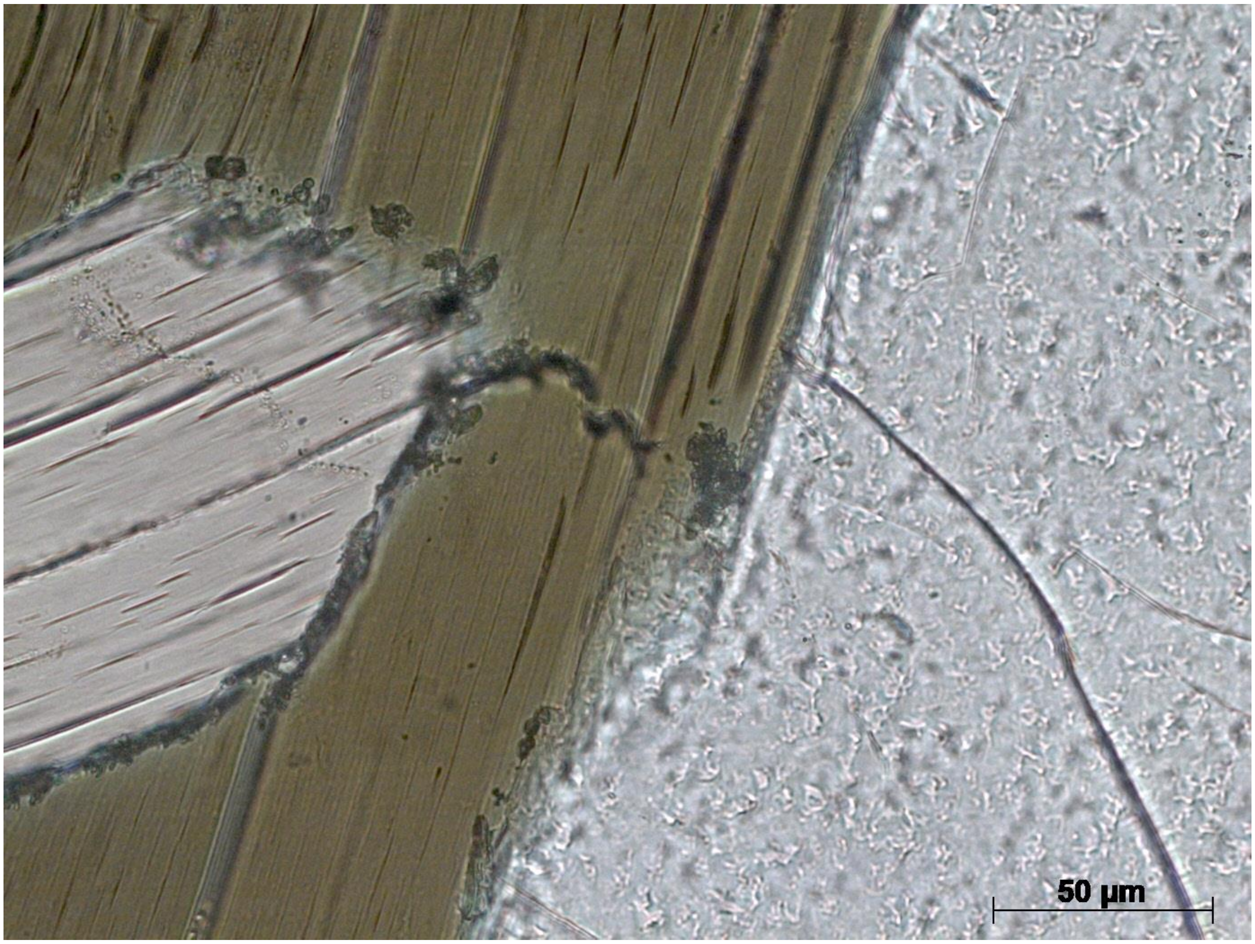
LT-1_53_64-53_73_20x_ppl_007	Clinopyroxenite

Thin Section Image 07. Closer inspection of the clinopyroxenite emphasizes the boundary between two coarsely-crystalline augite clinopyroxene crystals. At center is the pale-green, fibrous alteration mineral uralite, an amphibole mineral. The opaque phase at lower-left is magnetite. The blue at left is a void space filled in with dyed epoxy resin. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



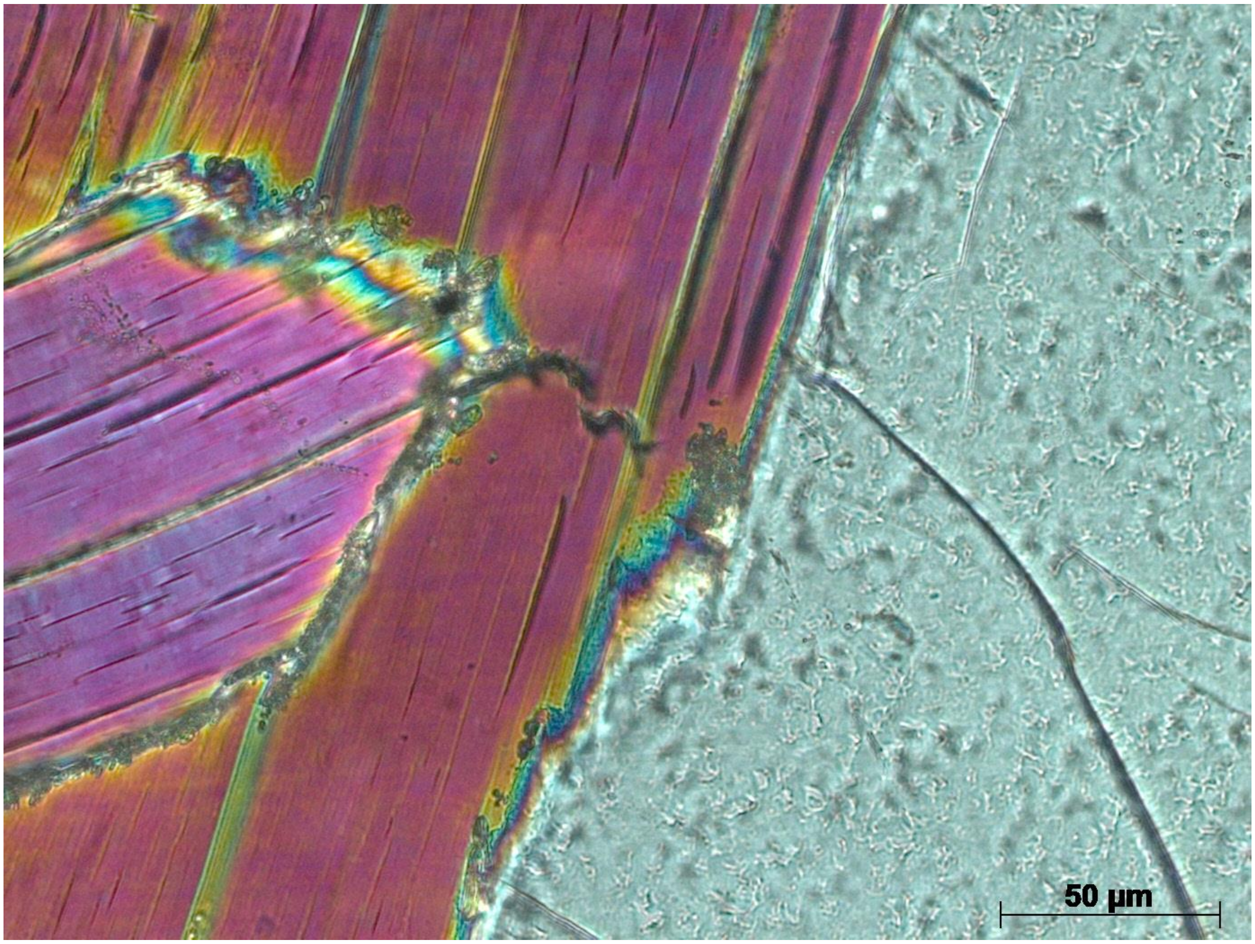
LT-1_53_64-53_73_20x_xpl_008	Clinopyroxenite

Thin Section Image 08. The same view of thin section image 07 but under crossed-polarized light illustrates the bright, middle-second order interference colors of augite-clinopyroxene from purple to red, to yellow and blue. Crossed-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



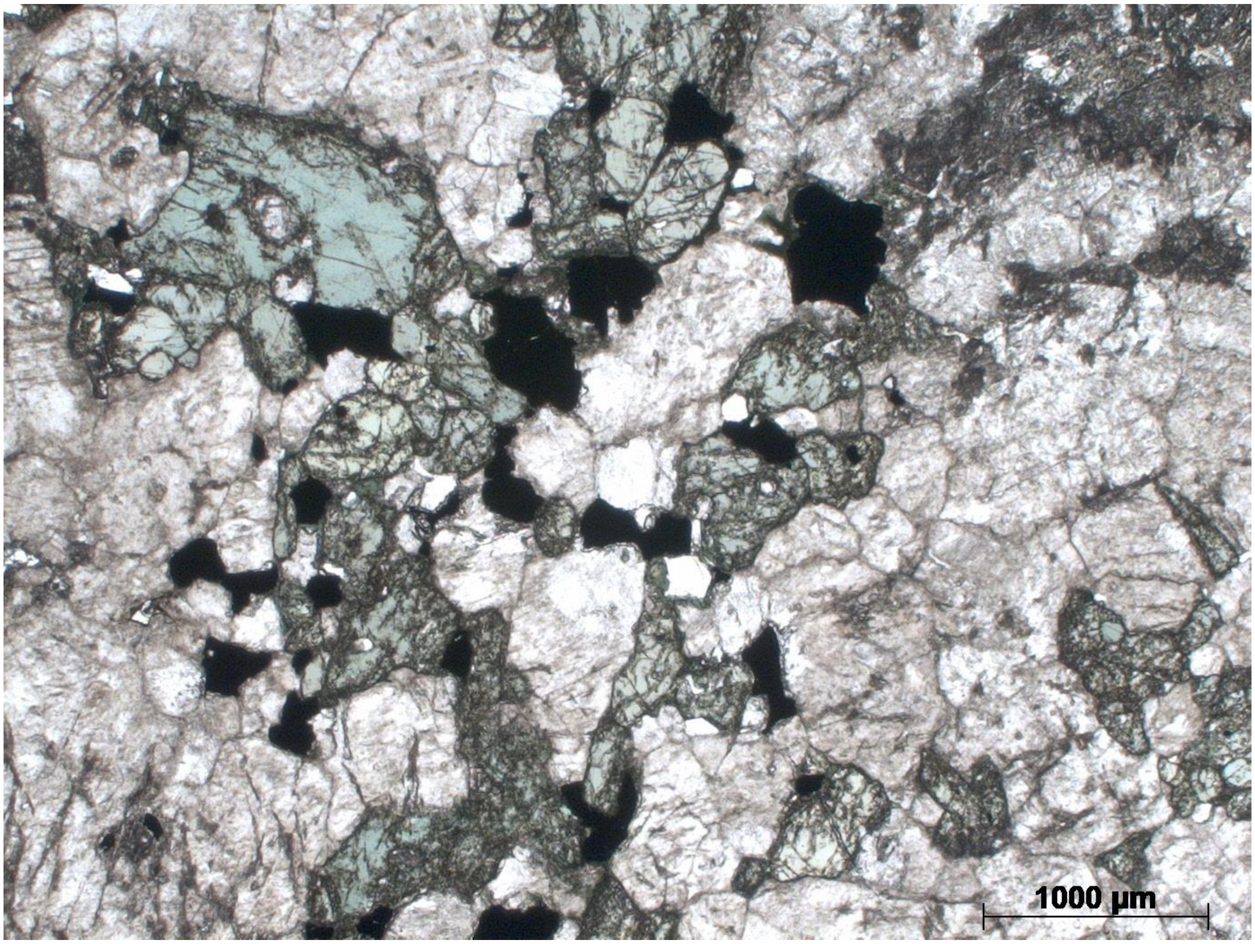
LT-1_53_64-53_73_50x_ppl_009	Clinopyroxenite

Thin Section Image 09. Highest magnification view of the clinopyroxenite emphasizes the crystal boundary between pale-green, pleochroic biotite/phlogopite with colorless augite-clinopyroxene at right. One excellent cleavage plane is very apparent in the biotite/phlogopite. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



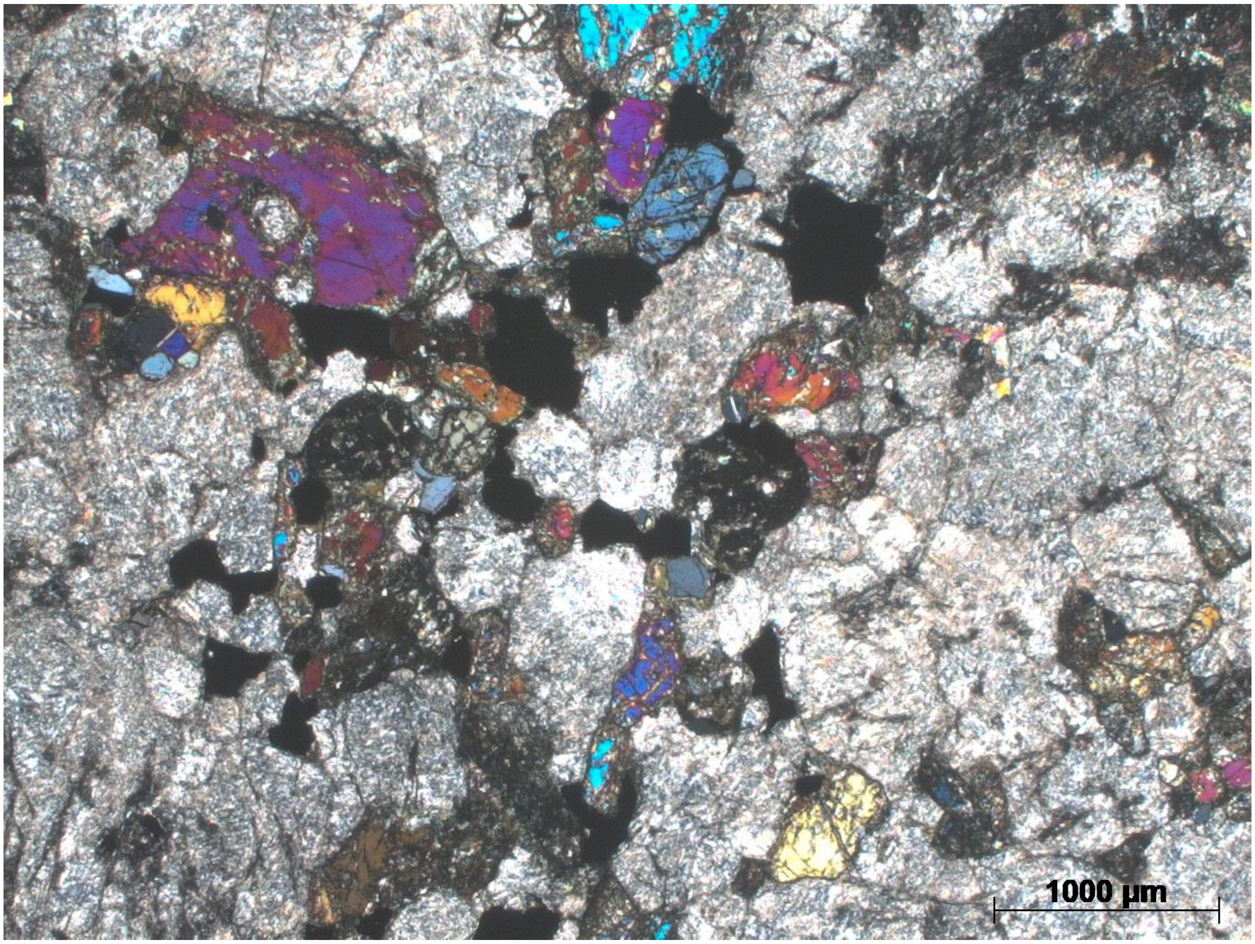
LT-1_53_64-53_73_50x_xpl_010	Clinopyroxenite

Thin Section Image 10. The same image as thin section image 09 but under crossed-polarized light illustrates the bright purple, yellow, and pink second-order interference colors of the biotite/phlogopite. In contrast, the augite at this crystallographic orientation shows a subtle blue middle, second-order interference color. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



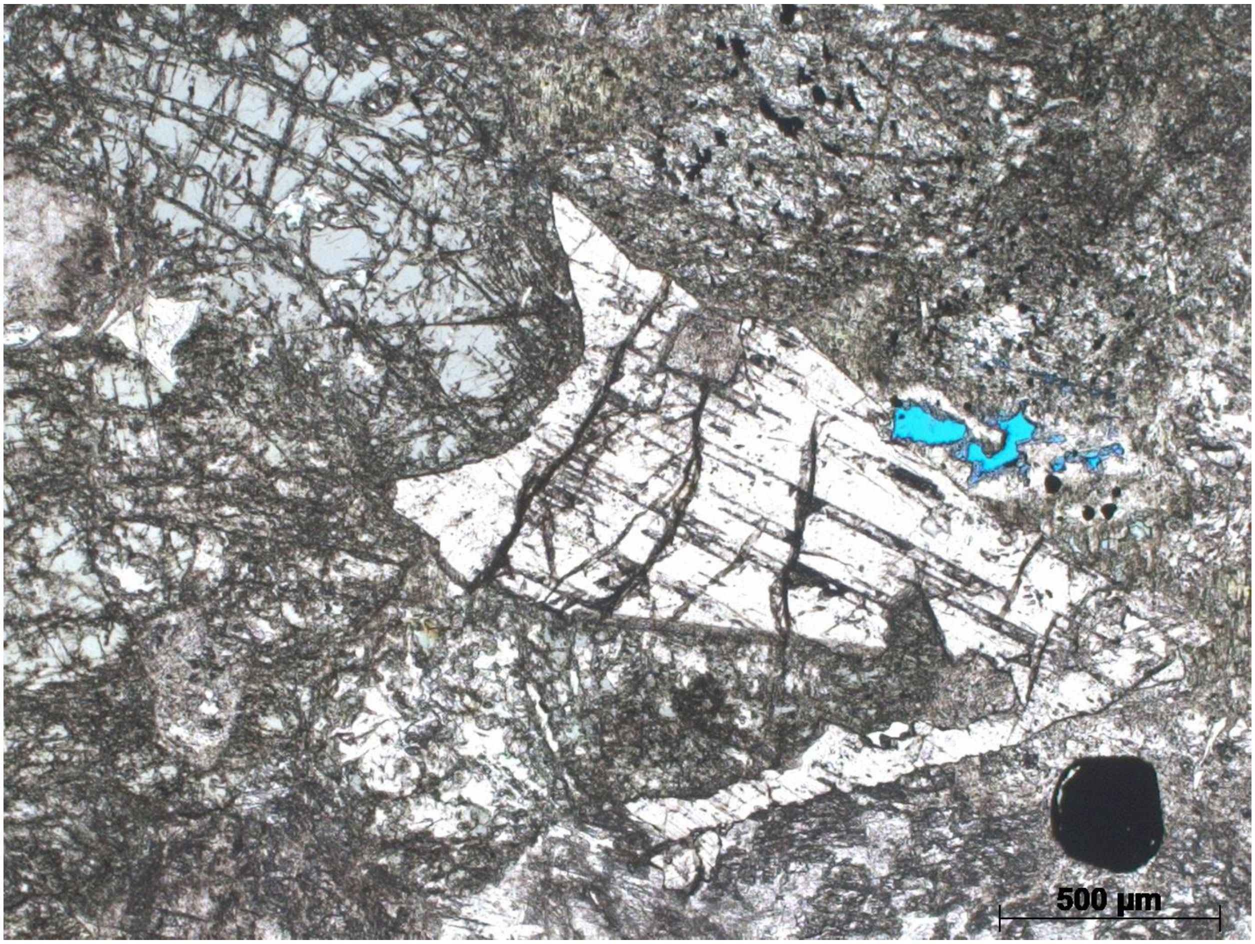
LT-1_99_9-99_99_2_5x_ppl_011	Gabbro (heavily altered)

Thin Section Image 11. Low magnification view of a heavily altered gabbro illustrates abundant plagioclase feldspar crystals (gray) that are extensively replaced with sericite. Light green augite-clinopyroxene is also common, as is opaque magnetite. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



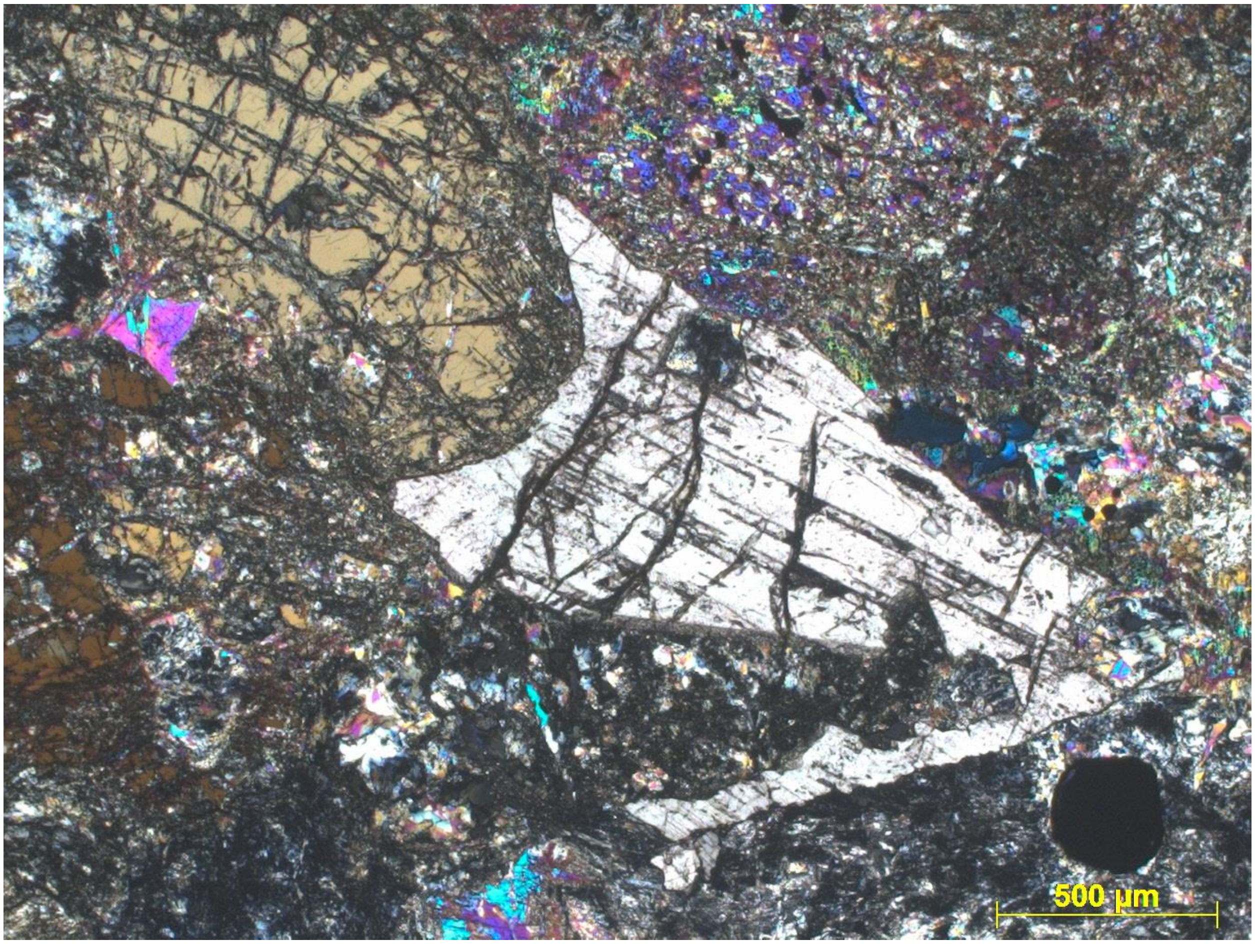
LT-1_99_9-99_99_2_5x_xpl_012	Gabbro (heavily altered)

Thin Section Image 12. The same photo as in thin section image 11 but taken under crossed-polarized light reveals bright, upper-second order interference colors of clinopyroxene phenocrysts (augite) from pale-yellow to bright blue, orange, purple, and red. The sericite-replaced plagioclase is gray to bright white with high second-order interference colors like that of muscovite, a chemically identical mineral. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



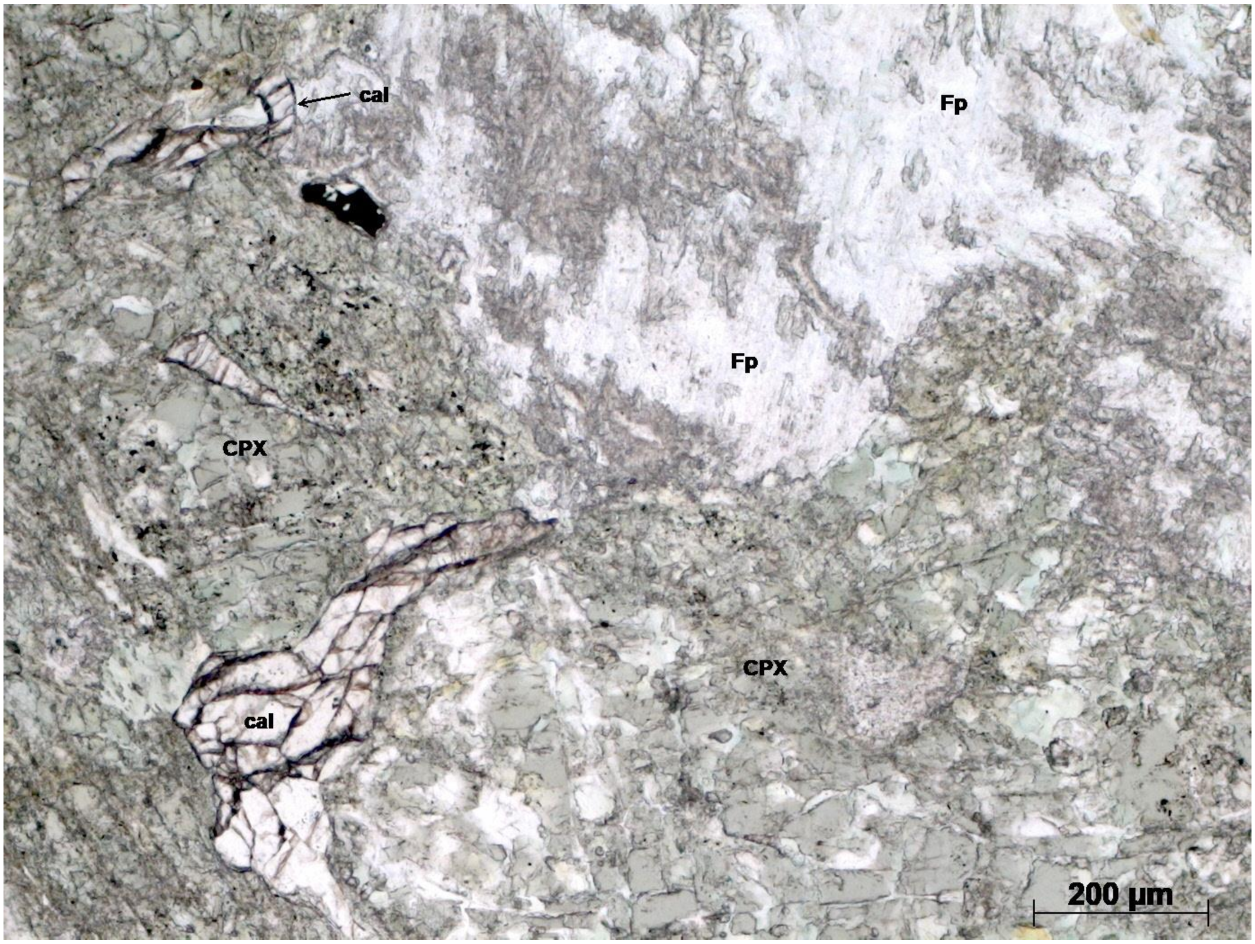
LT-1_99_9-99_99_5x_ppl_013	Gabbro (heavily altered)

Thin Section Image 13. Medium magnification view of the heavily altered gabbro illustrates the extensive sericite replacement of plagiolcase feldspar and serpentine and uralite alteration of augite-clinopyroxene. The bright white corroded crystal at center is a twinned plagiolcase feldspar. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



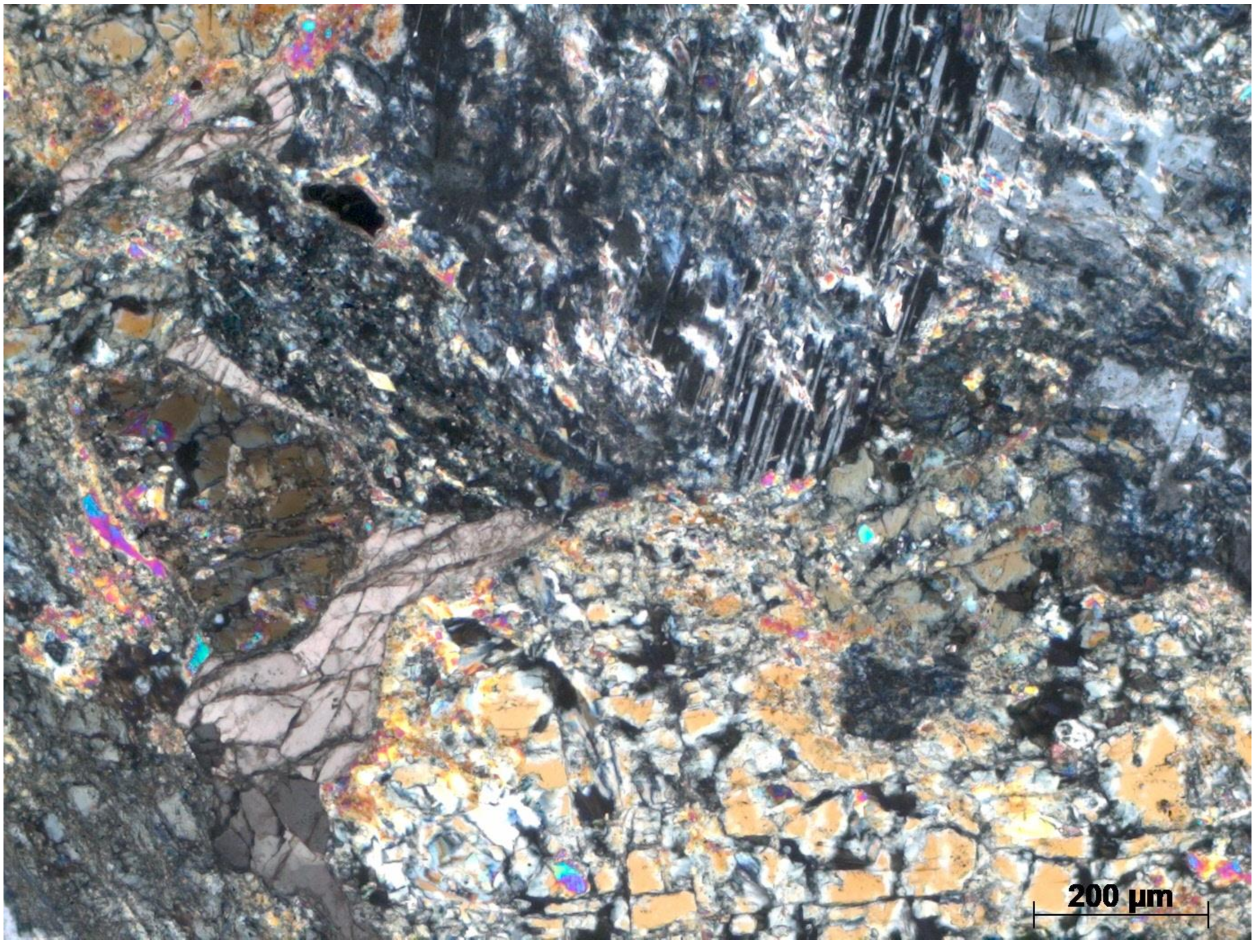
LT-1_99_9-99_99_5x_xpl_014	Gabbro (heavily altered)

Thin Section Image 14. The same image as thin section image 13 but taken under crossed-polarized light illustrates the middle second-order interference colors of augite from yellow, blue, green, purple and red. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



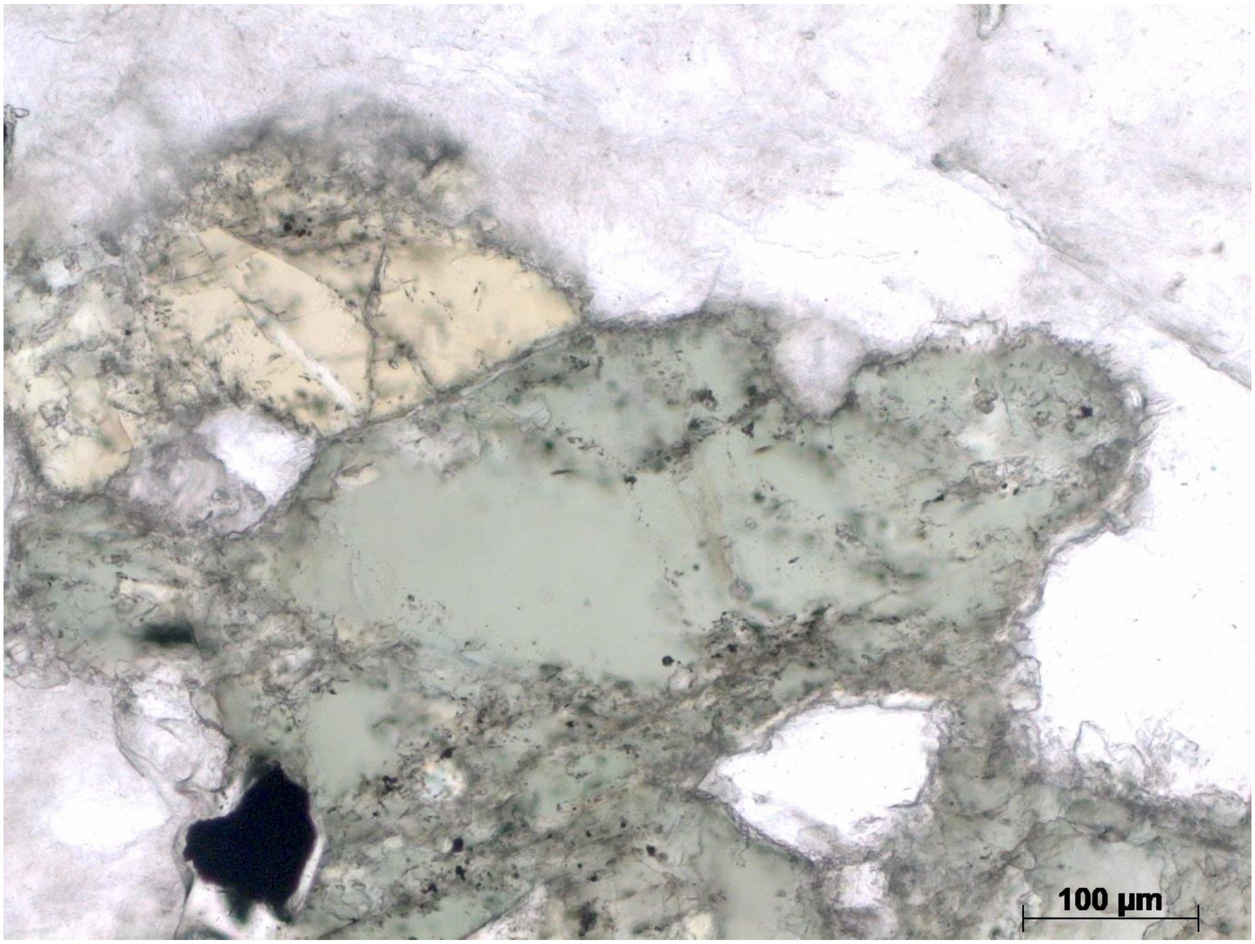
LT-1_99_9-99_99_10x_ppl_015	Gabbro (heavily altered)

Thin Section Image 15. Greater detail of the gabbro reveals partially intact plagiolcase feldspar (white, Fp) and sericite alteration (medium gray). Surrounding pale-green augite-clinopyroxene (CPX) is partially altered to serpentine (colorless). At left, high-relief calcite cement (cal) indicates hydrothermal alteration. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



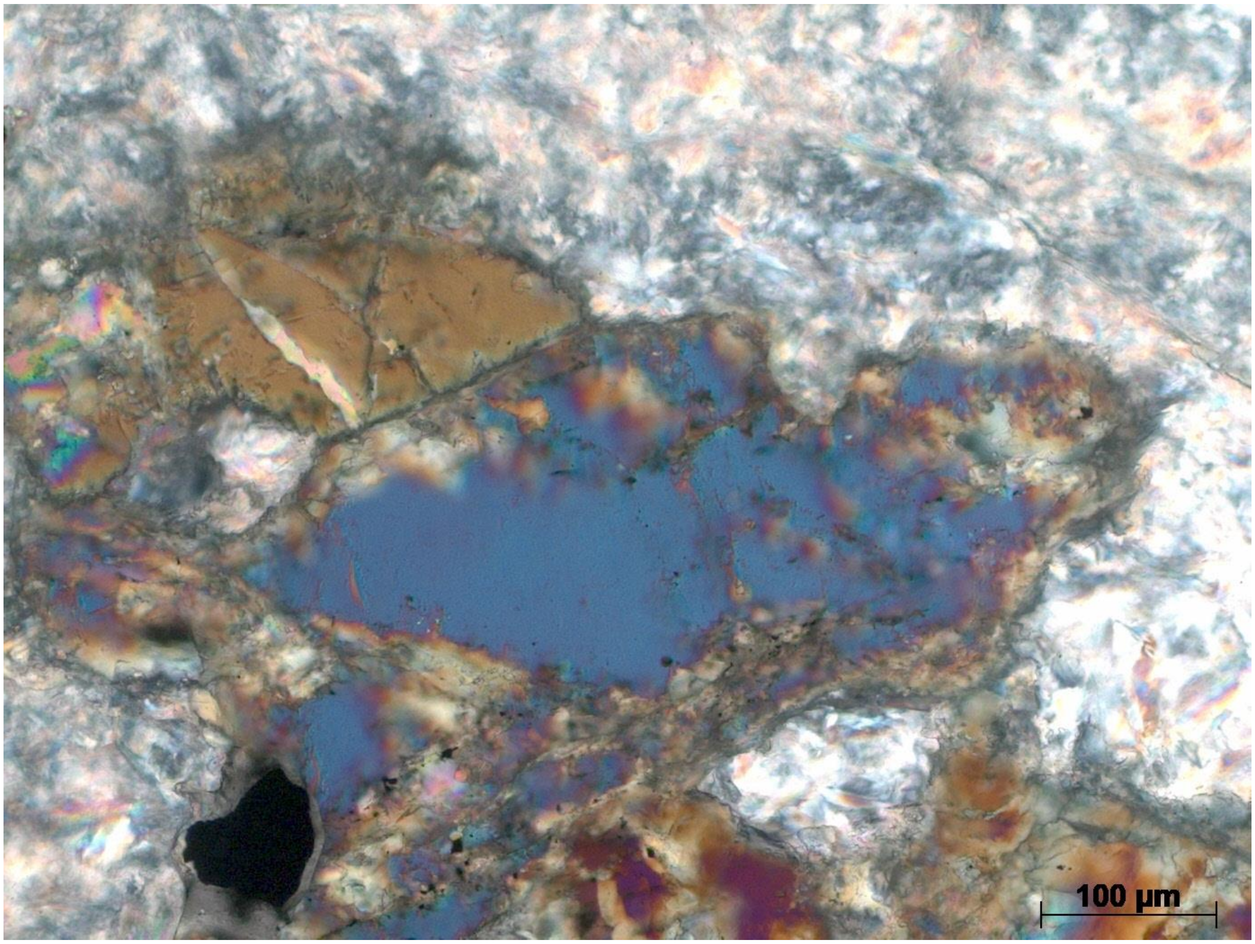
LT-1_99_9-99_99_10x_xpl_016	Gabbro (heavily altered)

Thin Section Image 16. The same view as in thin section 15 but taken under crossed-polarized light to show the bright second-order interference colors of the augite. The serpentine replacement of the augite shows low, first-order gray to black interference colors. Also note the plagioclase feldspar polysynthetic twinning at upper-right and the bright white interference colors of the sericite alteration. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



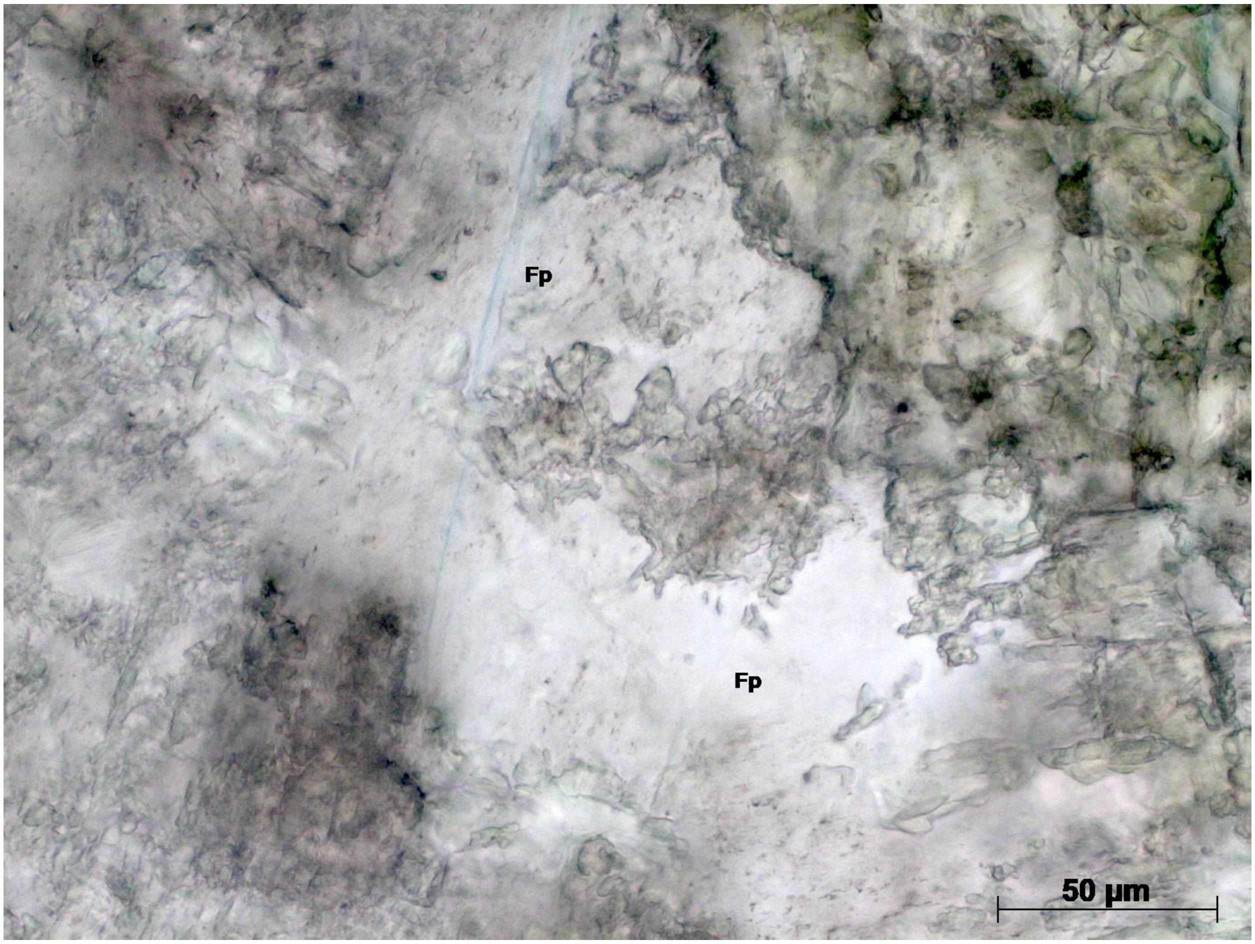
LT-1_99_9-99_99_20x_ppl_017	Gabbro (heavily altered)

Thin Section Image 17. Increased magnification view of the intersection between two finely-crystalline augite crystals. A prismatic crystal habit and slight pleochroism from pale yellow to green is apparent in the augite. The white mineral phase is plagiolcase feldspar completely replaced with sericite. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



LT-1_99_9-99_99_20x_xpl_018	Gabbro (heavily altered)

Thin Section Image 18. The same view of thin section 17 but under crossed-polarized light illustrates the bright, second-order interference colors of augite. The sericite replacement exhibits a bright white to yellow second-order interference colors similar to muscovite. Crossed-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.

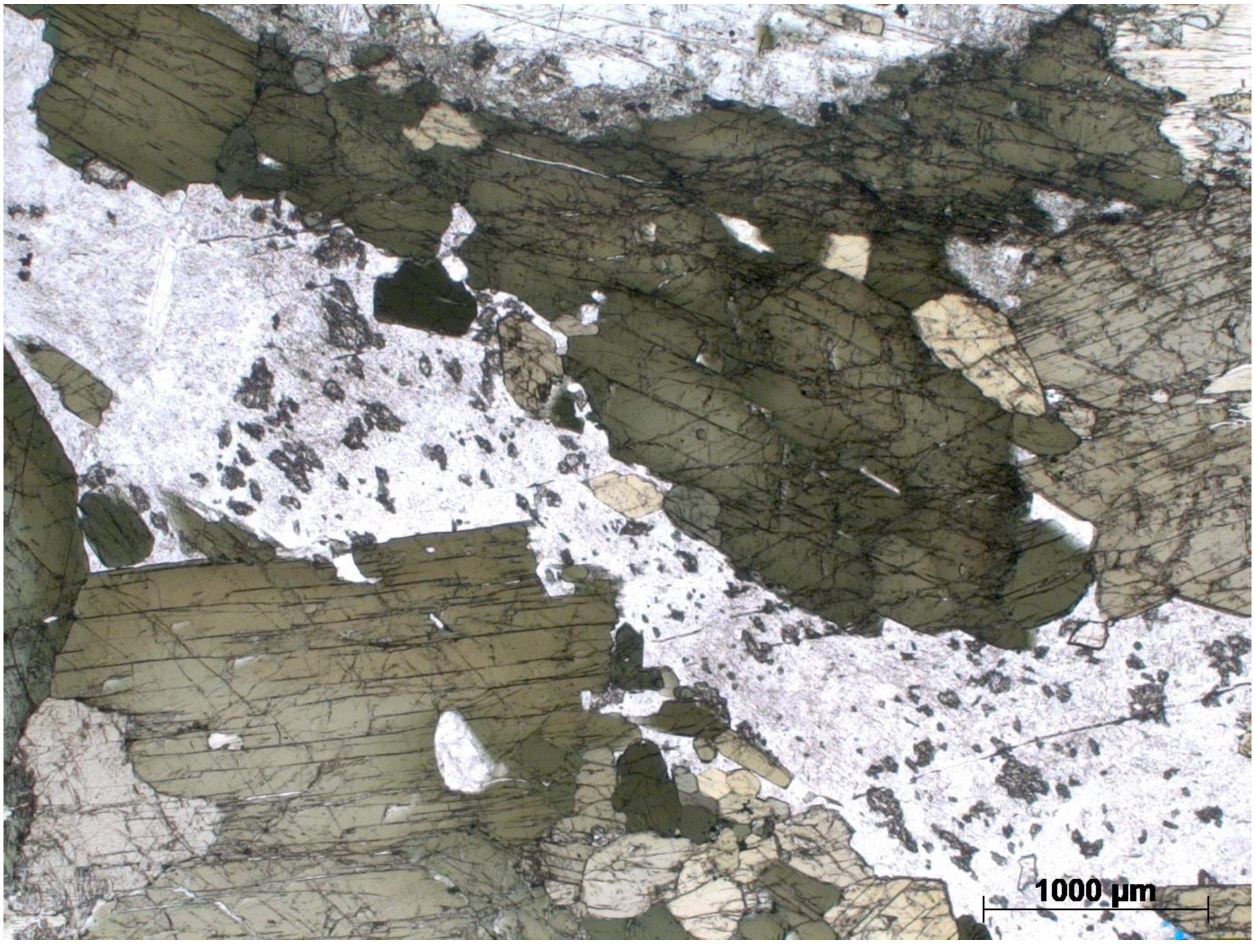


LT-1_99_9-99_99_50x_ppl_019	Gabbro (heavily altered)

Thin Section Image 19. Highest magnification view of low-relief, plagiolcase feldspar at center (Fp), higher-relief sericite replacement at lower-left, and serpentine-and-chlorite alteration of augite-clinopyroxene (white to pale-green) at upper-right. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.

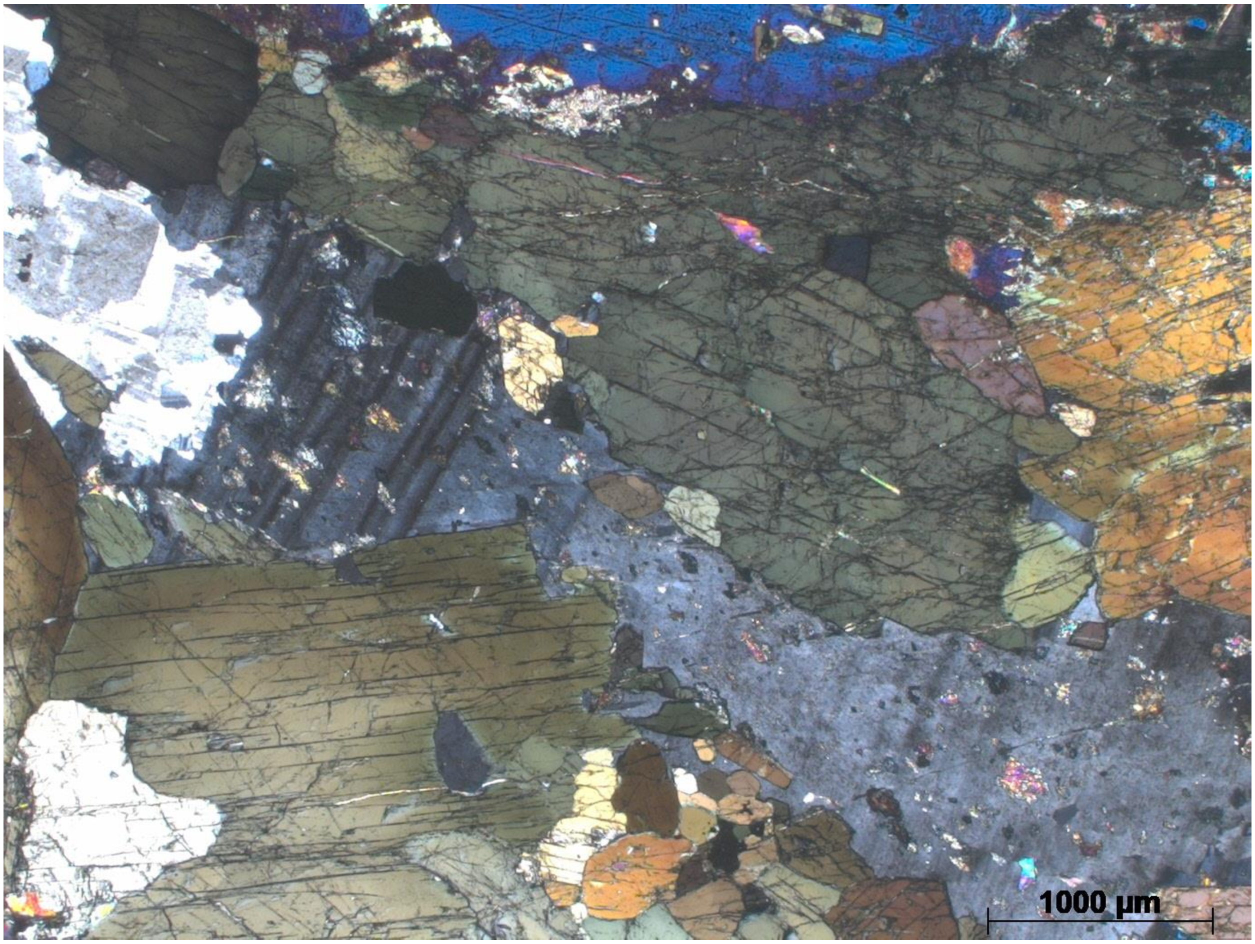
LT-1_99_9-99_99_50x_xpl_020	Gabbro (heavily altered)

Thin Section Image 20. The same image as thin section image 19 but under crossed-polarized light reveals low, first order gray interference colors and polysynthetic twinning of plagiolcase feldspar. The green augite at upper-right is partially replaced with serpentine and chlorite and appears mottled. The sericite at lower-left shows bright, yellow, pink, and blue second-order interference colors. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



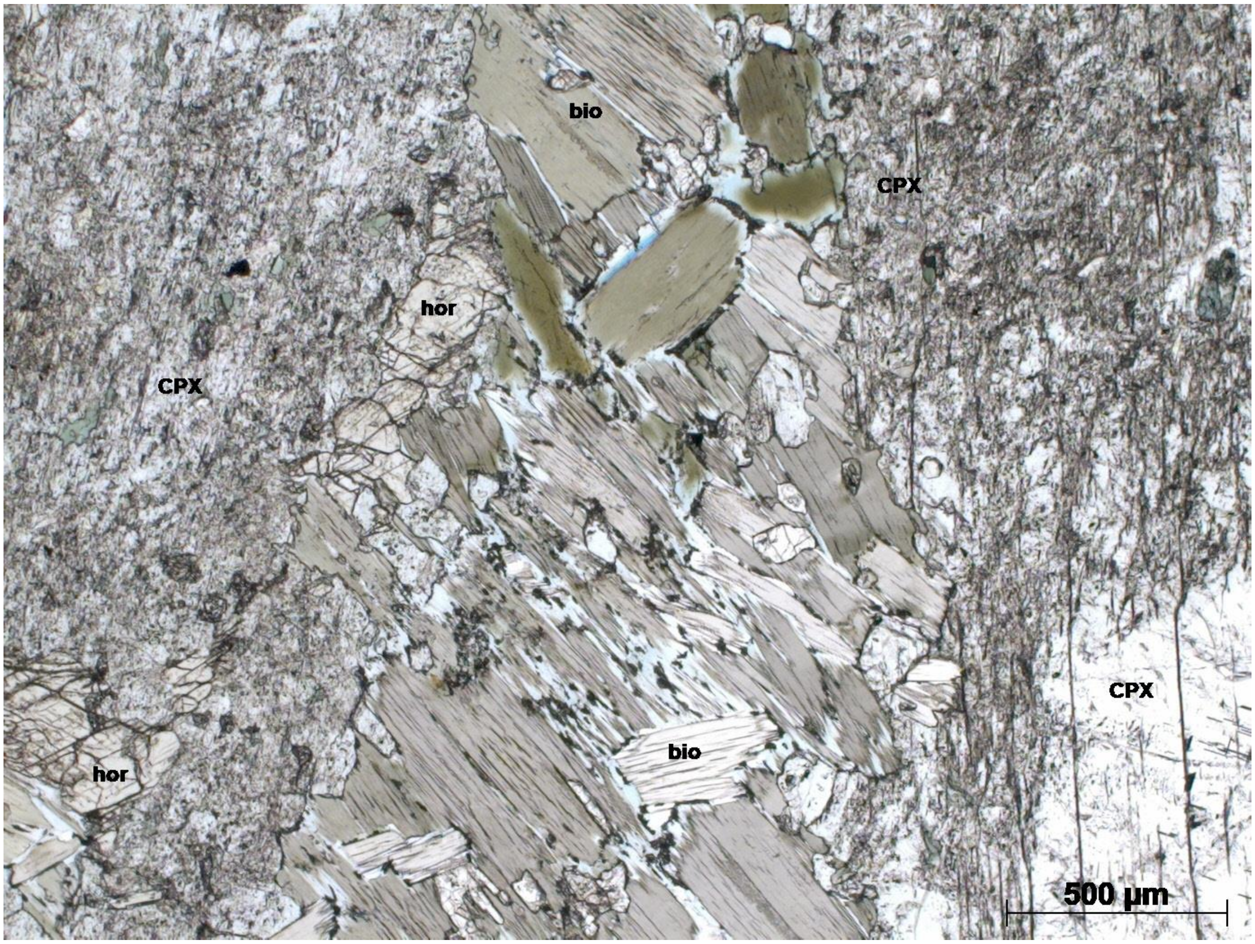
LT-3_63_17-63_26_2_5x_ppl_021	Clinopyroxenite

Thin Section Image 21. Low magnification overview of a clinopyroxenite exhibits abundant coarsely-crystalline hornblende crystals (pale-to-dark green, pleochroic) that rim a plagiolcase feldspar-filled vein (white). The surrounding high-relief crystals, as well as the small inclusions within the vein are augite-clinopyroxene. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



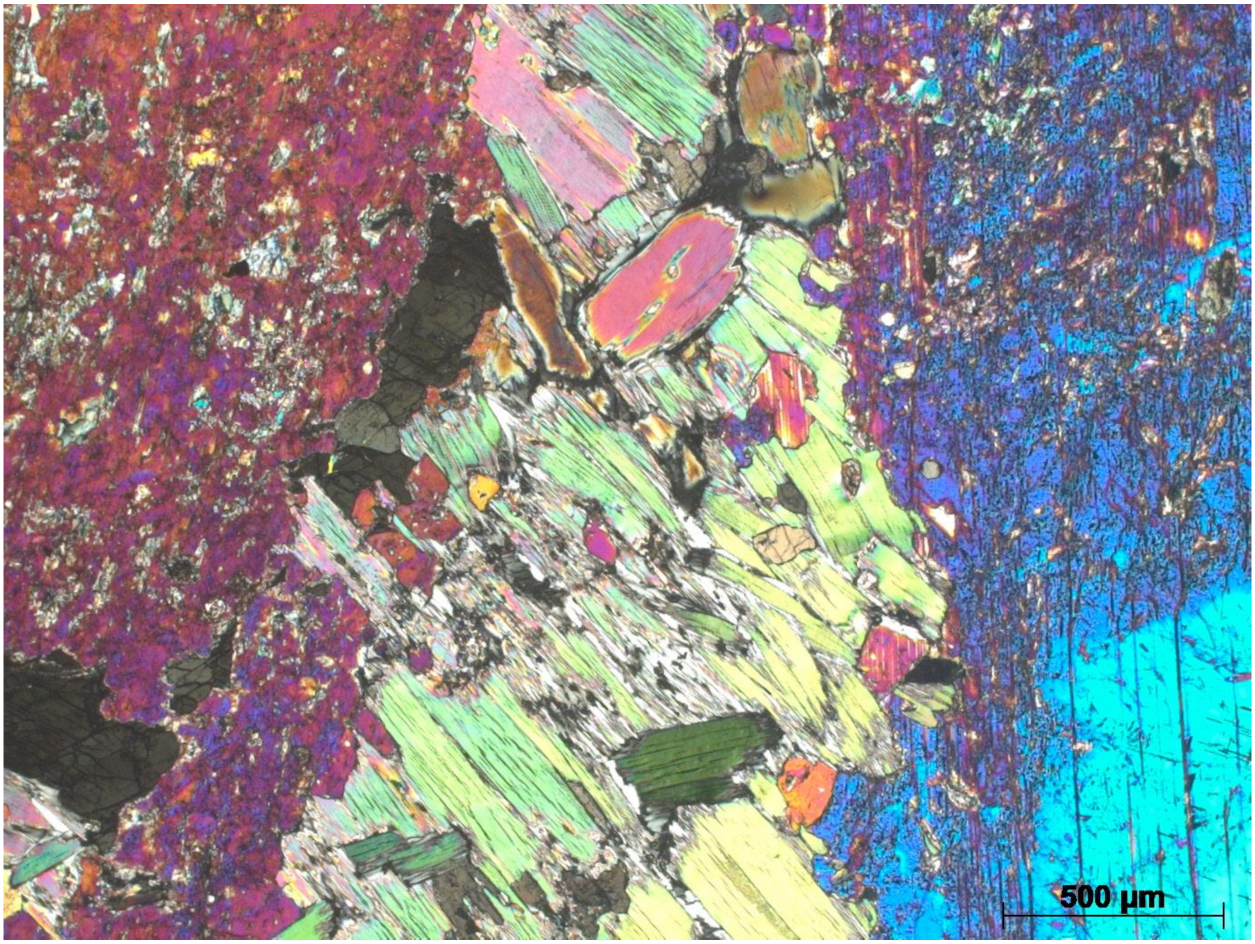
LT-3_63_17-63_26_2_5x_xpl_022	Clinopyroxenite

Thin Section Image 22. The same photo as in thin section image 21 but taken under crossed-polarized light reveals bright, upper-second order interference colors of the augite clinopyroxene phenocrysts and vein inclusions. The hornblende shows a high-relief, deep green color and pleochroism, and characteristic amphibole cleavage and prismatic habit. The lower-relief plagiolcase feldspar within the vein shows polysynthetic twinning. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



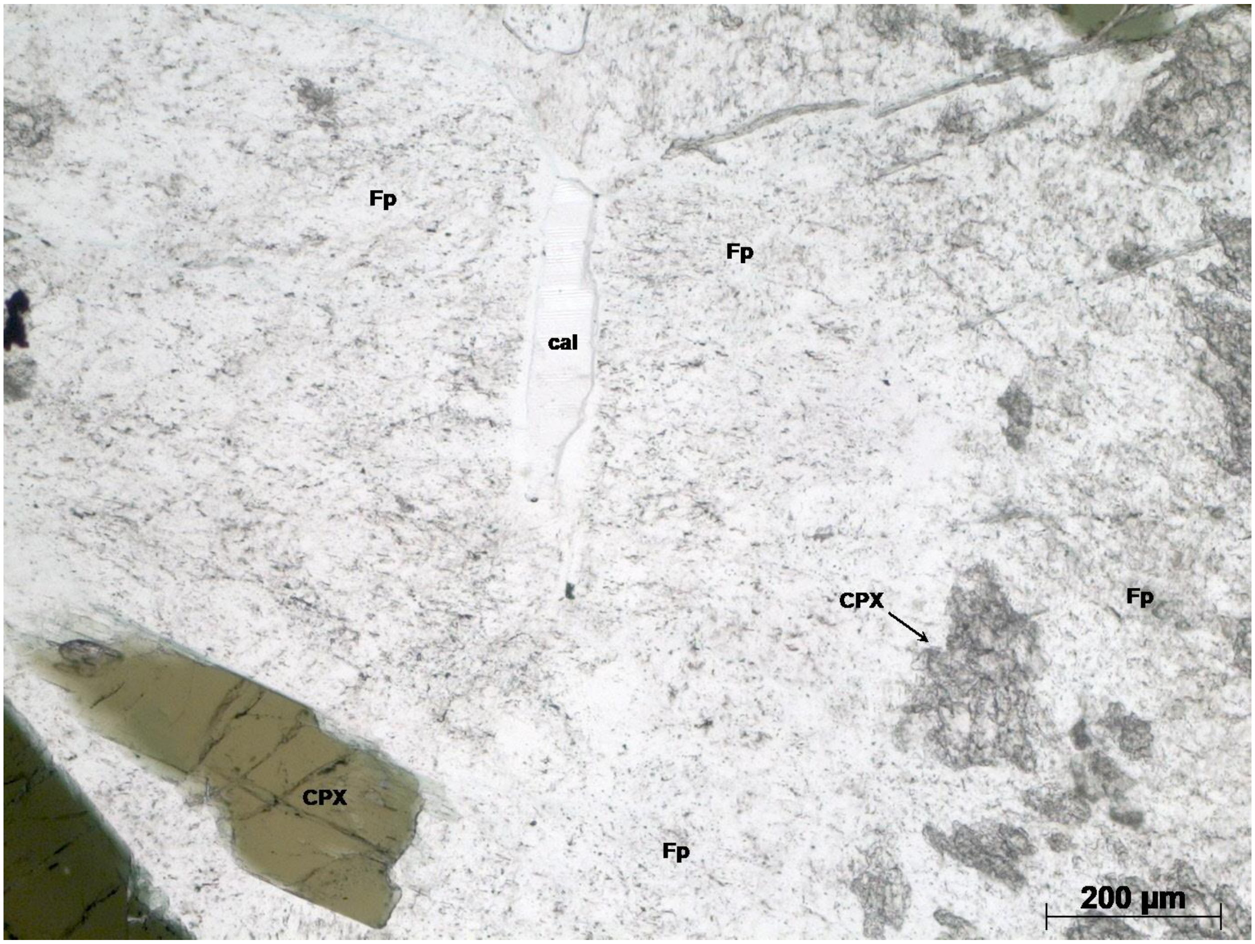
LT-3_6317-63_26_5x_ppl_023	Clinopyroxenite

Thin Section Image 23. Greater magnification view of the clinopyroxene shows interstitial biotite (bio) crystals at center between two coarsely-crystalline augite-clinopyroxene crystals (CPX) at left and right. Small, high-relief hornblende crystals are noted at left and lower-right (hor). The biotite exhibits a pale-green pleochroism and one good cleavage. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



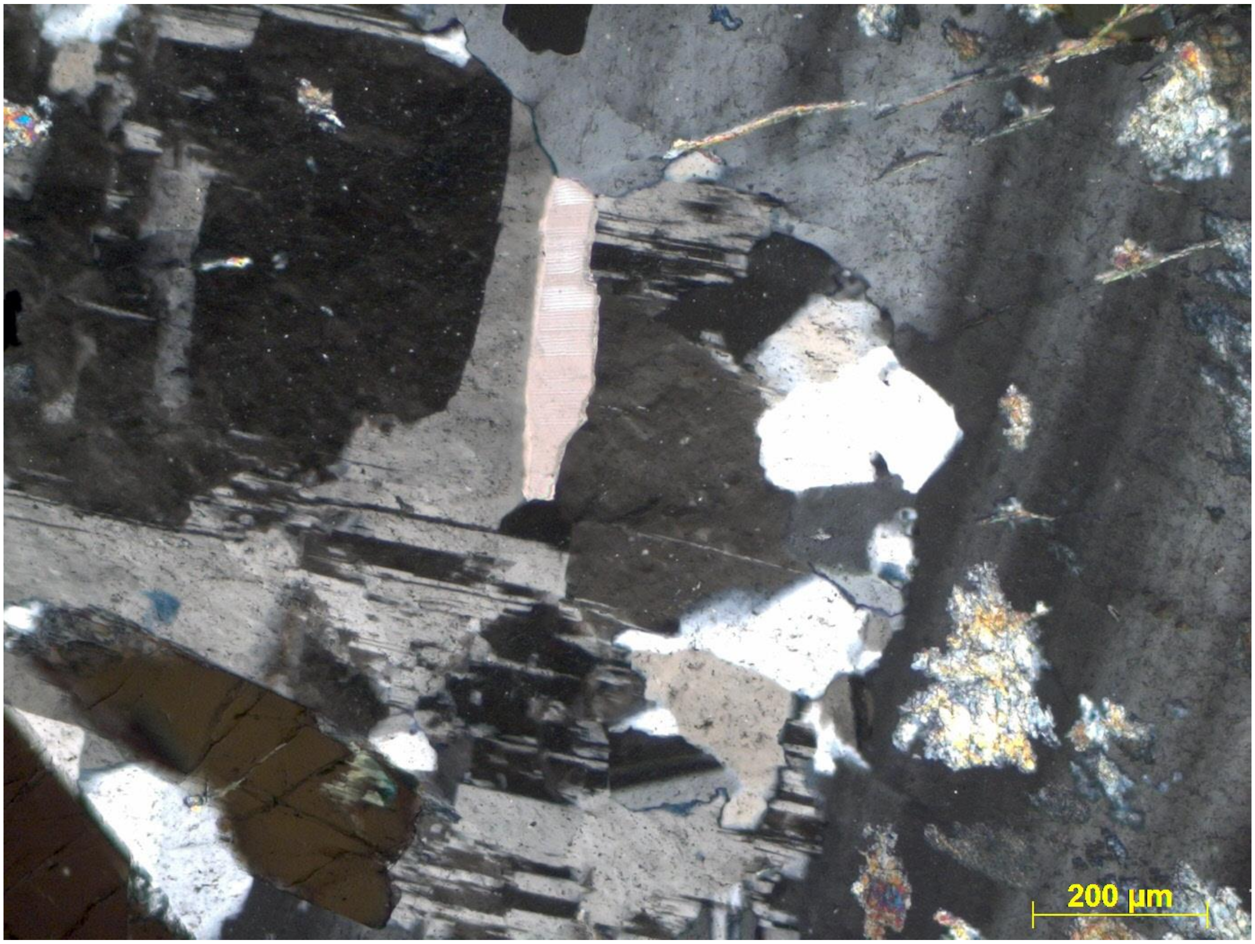
571_TEL-JL-BH5#9_5x_ppl_024	Clinopyroxenite

Thin Section Image 24. The same image as thin section image 23 but taken under crossed-polarized light illustrates middle second-order green and pink interference colors of the biotite contrasting against the vibrant purple, orange, violet, and blue middle second-order interference colors. Note the hornblende stays a dark green and is close to the maximum extinction angle. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



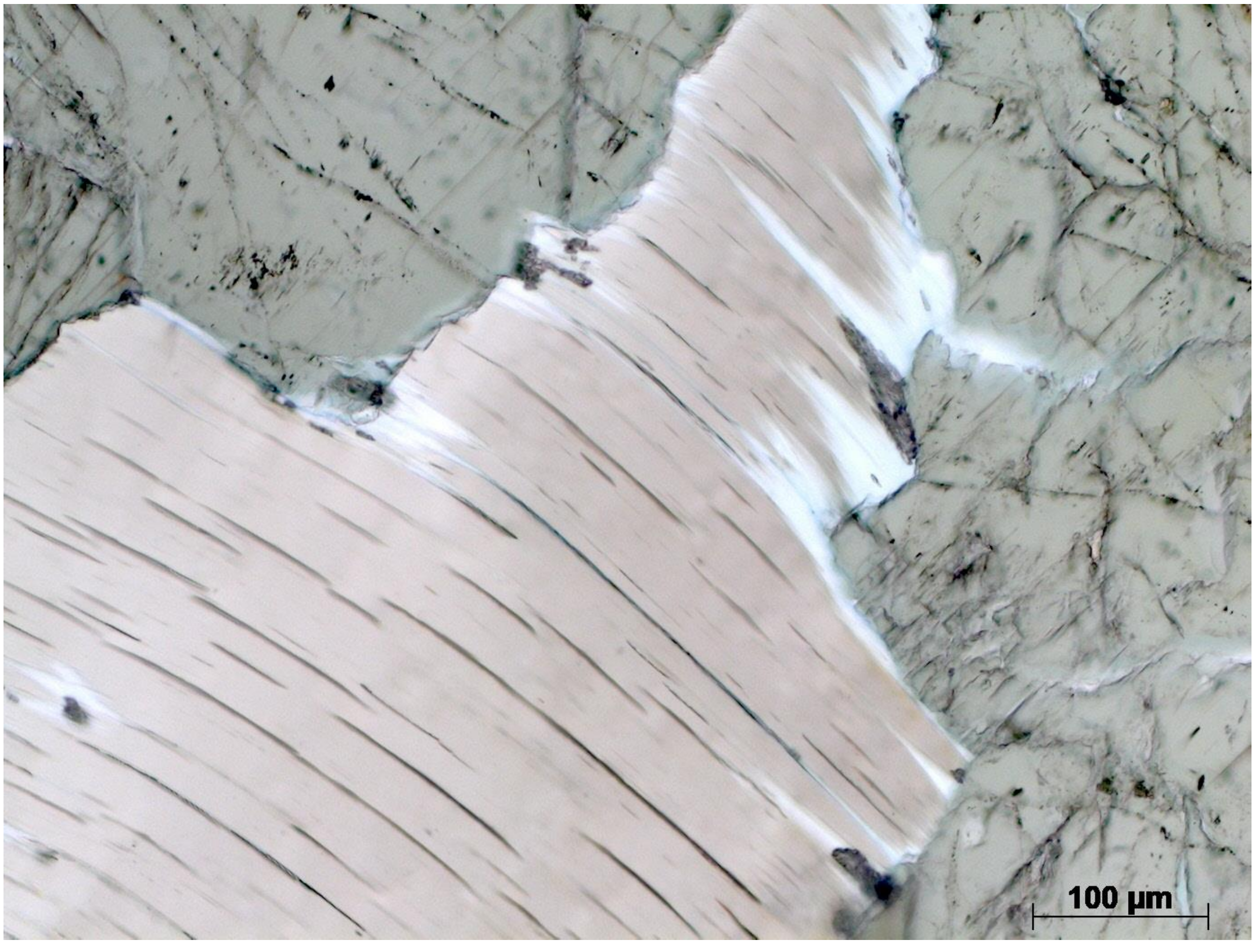
LT-3_6317-63_26_10x_ppl_025	Clinopyroxenite

Thin Section Image 25. Medium magnification view of the clinopyroxenite better illustrates the plagiolcase feldspar within the vein seen in Thin Section Images 21-22. Here, lower-relief feldspar (Fp) hosts inclusion of calcite (cal) and clinopyroxene (CPX). The CPX, now highly altered, was likely enveloped into a poikilitic texture by the hydrothermal fluids. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



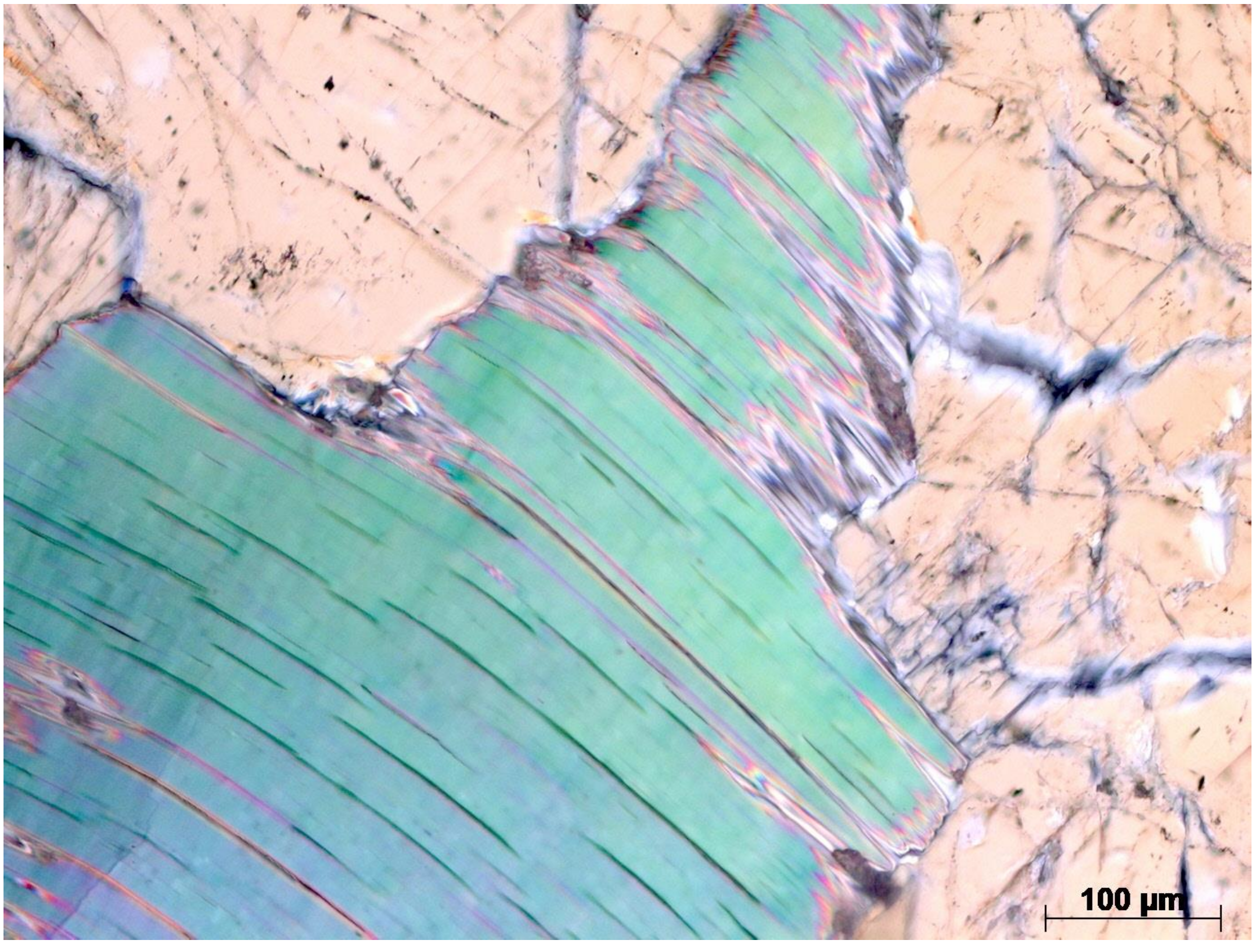
LT-3_6317-63_26_10x_xpl_026	Clinopyroxenite

Thin Section Image 26. The same view as in thin section 15 but taken under crossed-polarized light to show the uneven albite and pericline twinning of plagiolcase feldspar. The clinopyroxene inclusions exhibits bright white, yellow, yellow, and blue middle second-order interference colors. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



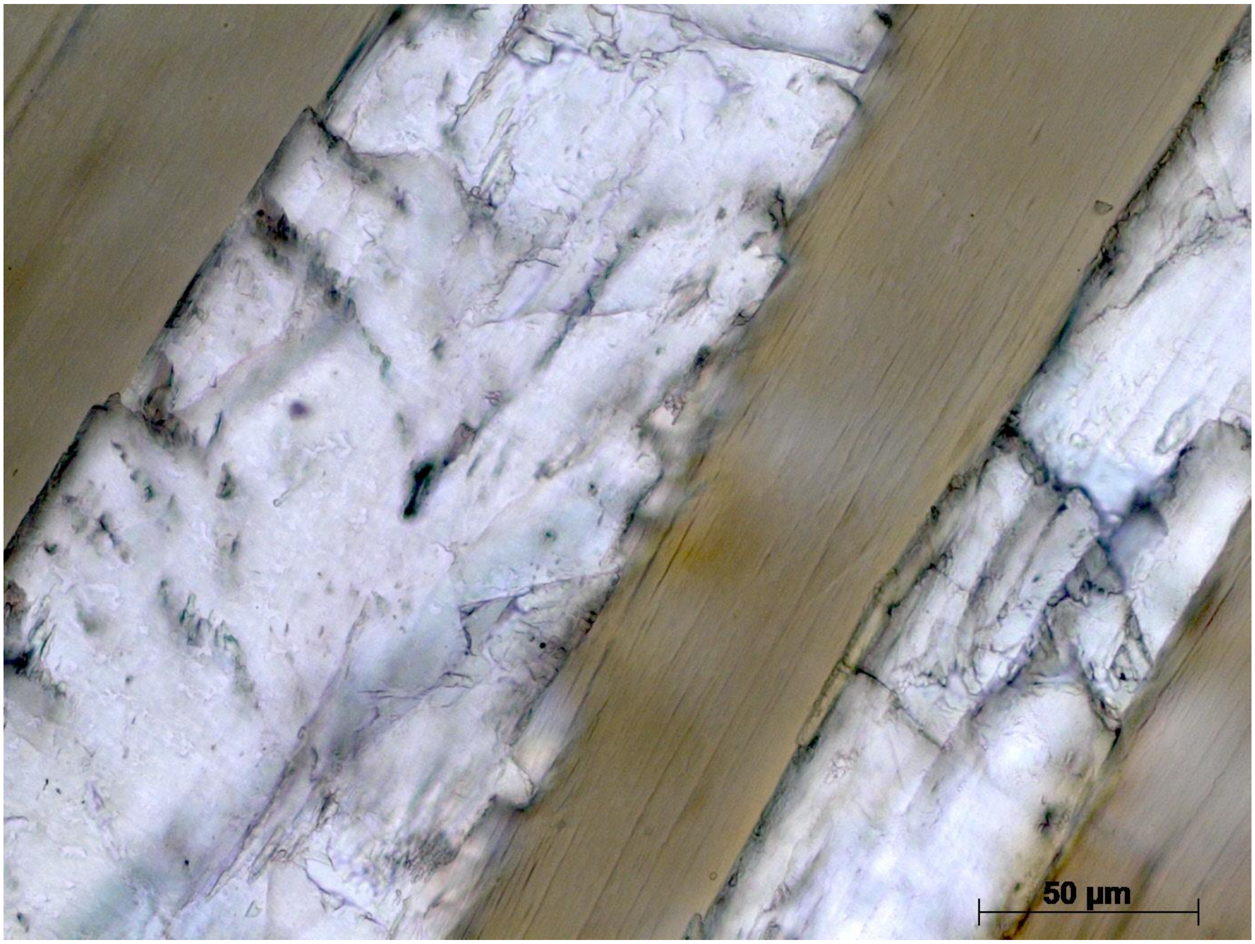
LT-3_6317-63_26_20x_ppl_027	Clinopyroxenite

Thin Section Image 27. Detailed view of the clinopyroxenite reveals the one excellent cleavage of biotite/phlogopite (bottom-left), as well as the higher-relief pale-green augite-clinopyroxene (right and top-left. The augite shows near 90-degree cleavage, and a prismatic habit. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



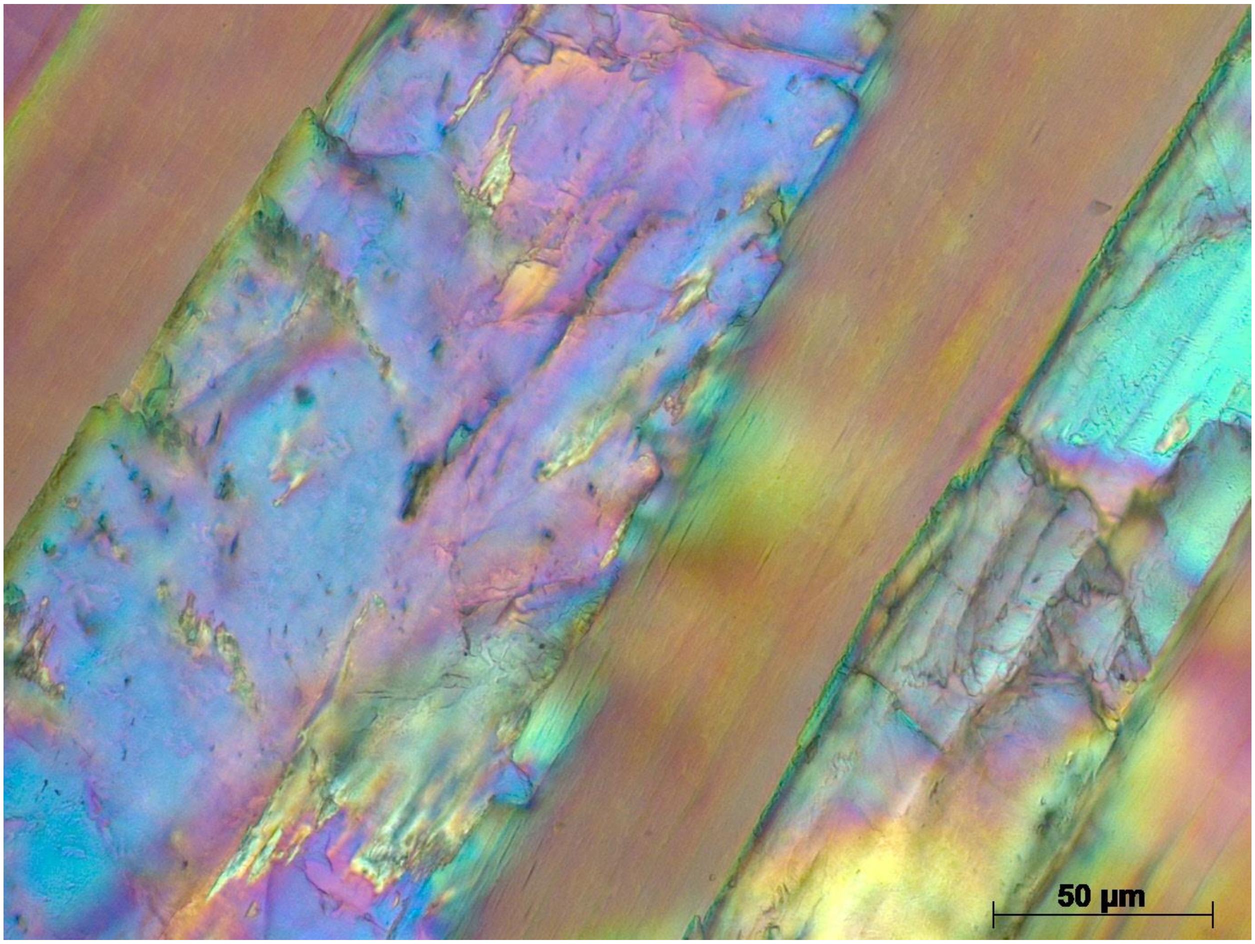
LT-3_6317-63_26_20x_xpl_028	Clinopyroxenite

Thin Section Image 28. The same view of thin section 27 but under crossed-polarized light illustrates the middle second-order yellow interference color of the augite-clinopyroxene, as well as the middle second-order pink, green, and blue of the biotite/phlogopite. Crossed-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



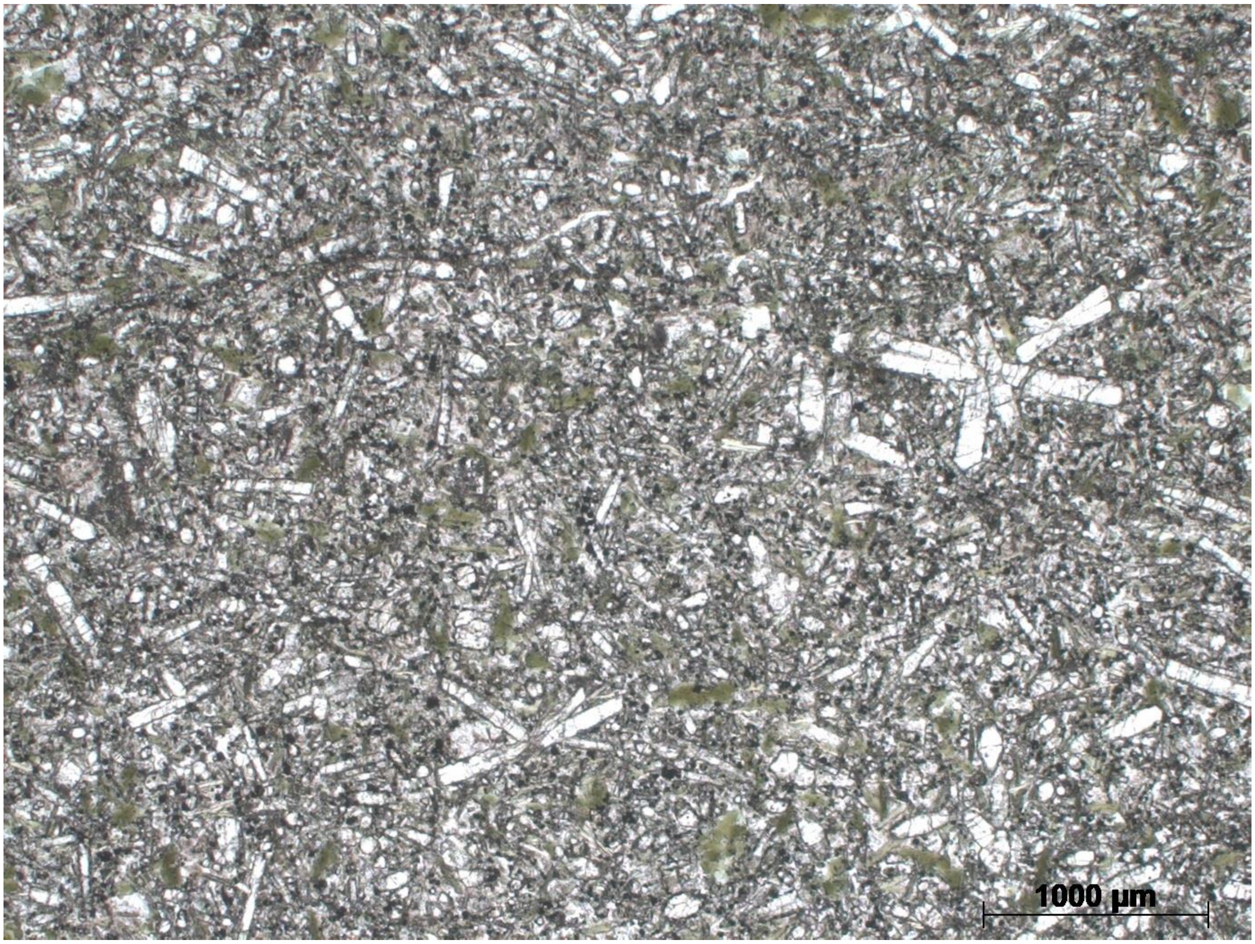
LT-3_63_17-63_26_50x_ppl_029	Clinopyroxenite

Thin Section Image 29. Highest magnification view of the clinopyroxenite reveals a closer perspective of pale-green, pleochroic biotite/phlogopite with colorless, high-relief augite-clinopyroxene. Note the difference in cleavages, from one good one in biotite versus two at almost 90-degrees in the augite. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



LT-3_6317-63_26_50x_xpl_030	Clinopyroxenite

Thin Section Image 30. The same image as thin section image 29 but under crossed-polarized light reveals bright, second-order interference colors in both the augite-clinopyroxene and the biotite/phlogopite. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.

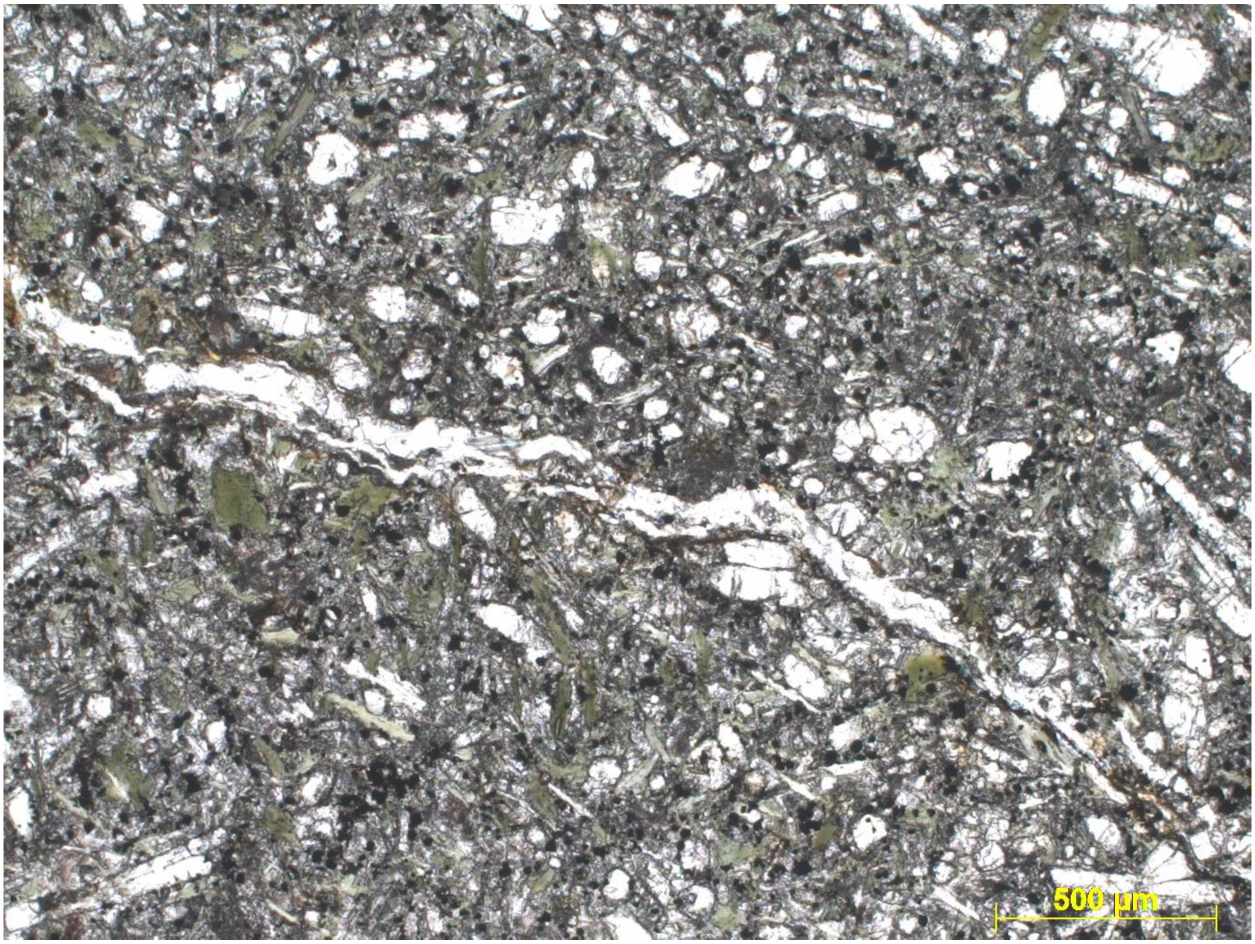


LT-6_24_72-24_8_2_5x_ppl_031	Alkaline Lamprophyre

Thin Section Image 31. Low magnification overview of an alkaline lamprophyre, with a composition between a camptonite and a fourchite, shows fine-grained, long, prismatic crystals of clinopyroxene (white), green biotite and hornblende, and opaque magnetite hosted by a groundmass of sericite-and-serpentine-replaced plagiolcase feldspar. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.

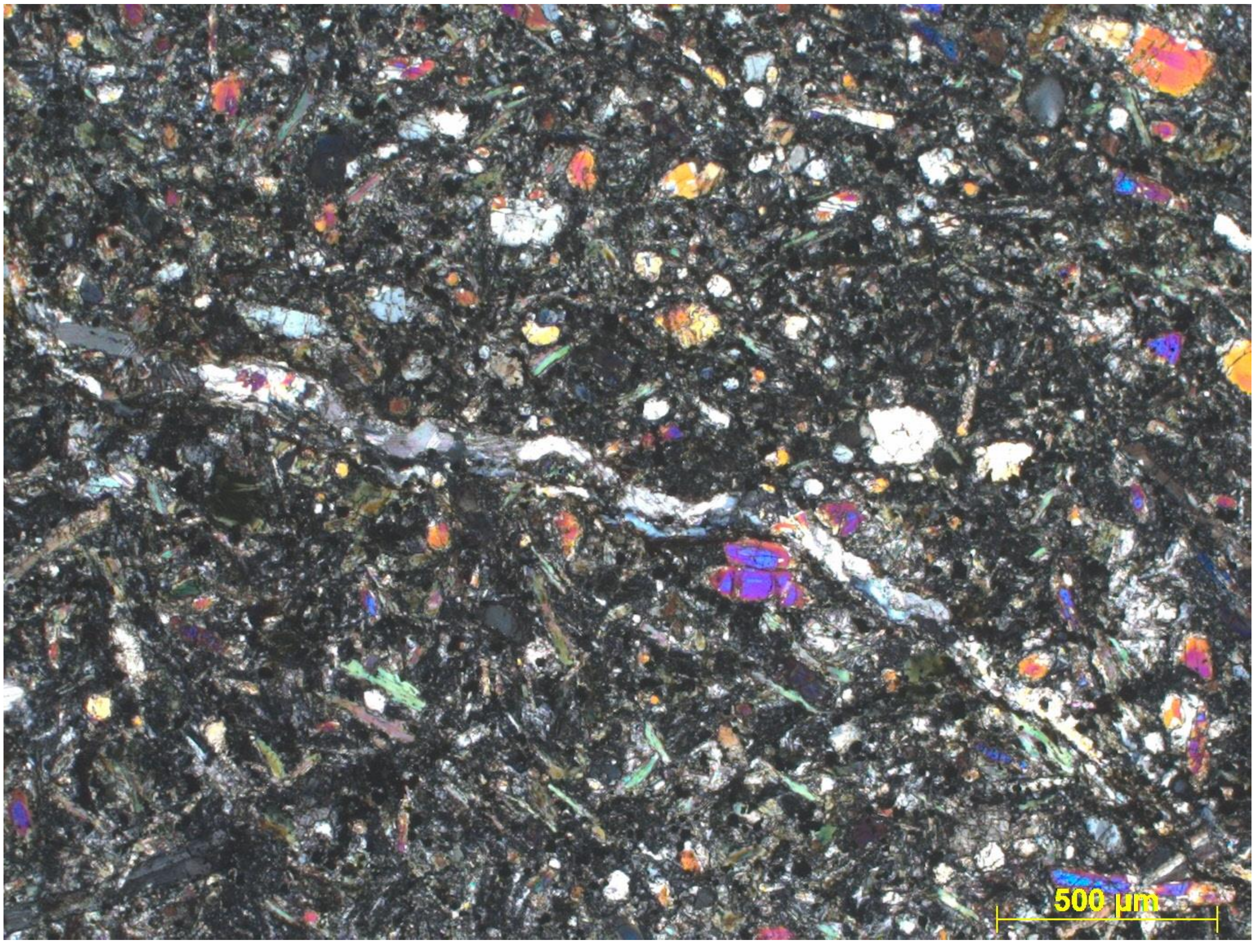
LT-6_24_72-24_8_2_5x_xpl_032	Alkaline Lamprophyre

Thin Section Image 32. The same photo as in thin section image 31 but taken under crossed-polarized light reveals bright, second-order interference colors of augite clinopyroxene within the elongate, prismatic crystals. Darker hornblende and serpentine are widely scattered in a groundmass of sericite-replaced plagiolcase feldspar. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



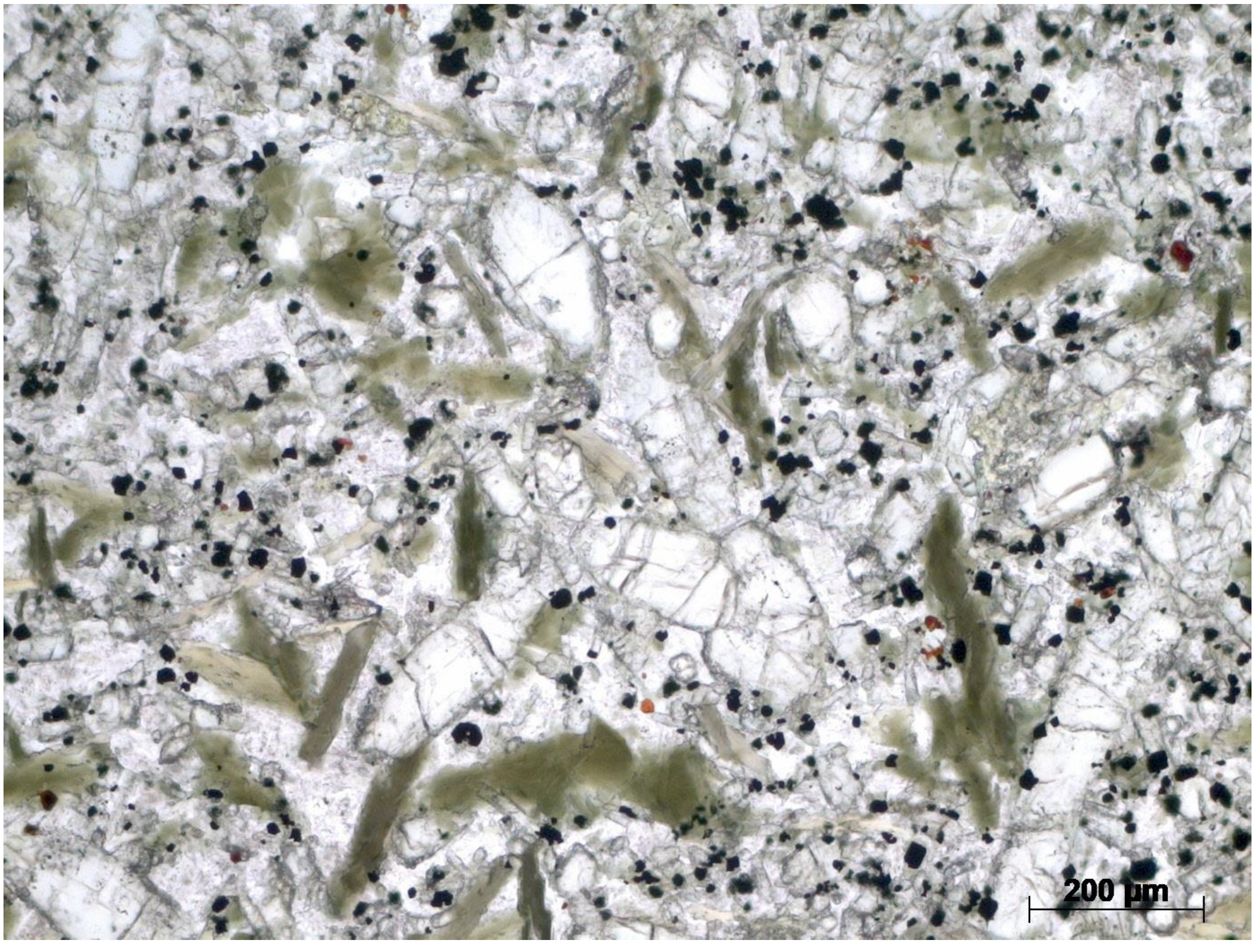
LT-6_24_72-24_8_5x_ppl_033	Alkaline Lamprophyre

Thin Section Image 33. More magnified view of the alkaline lamprophyre reveals a white calcite-filled vein that crosses the image indicating hydrothermal fluids and a source for mineral alteration. Elongate and rounded phenocrystals of augite clinopyroxene, adjacent to green hornblende and biotite are widely scattered in the matrix. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



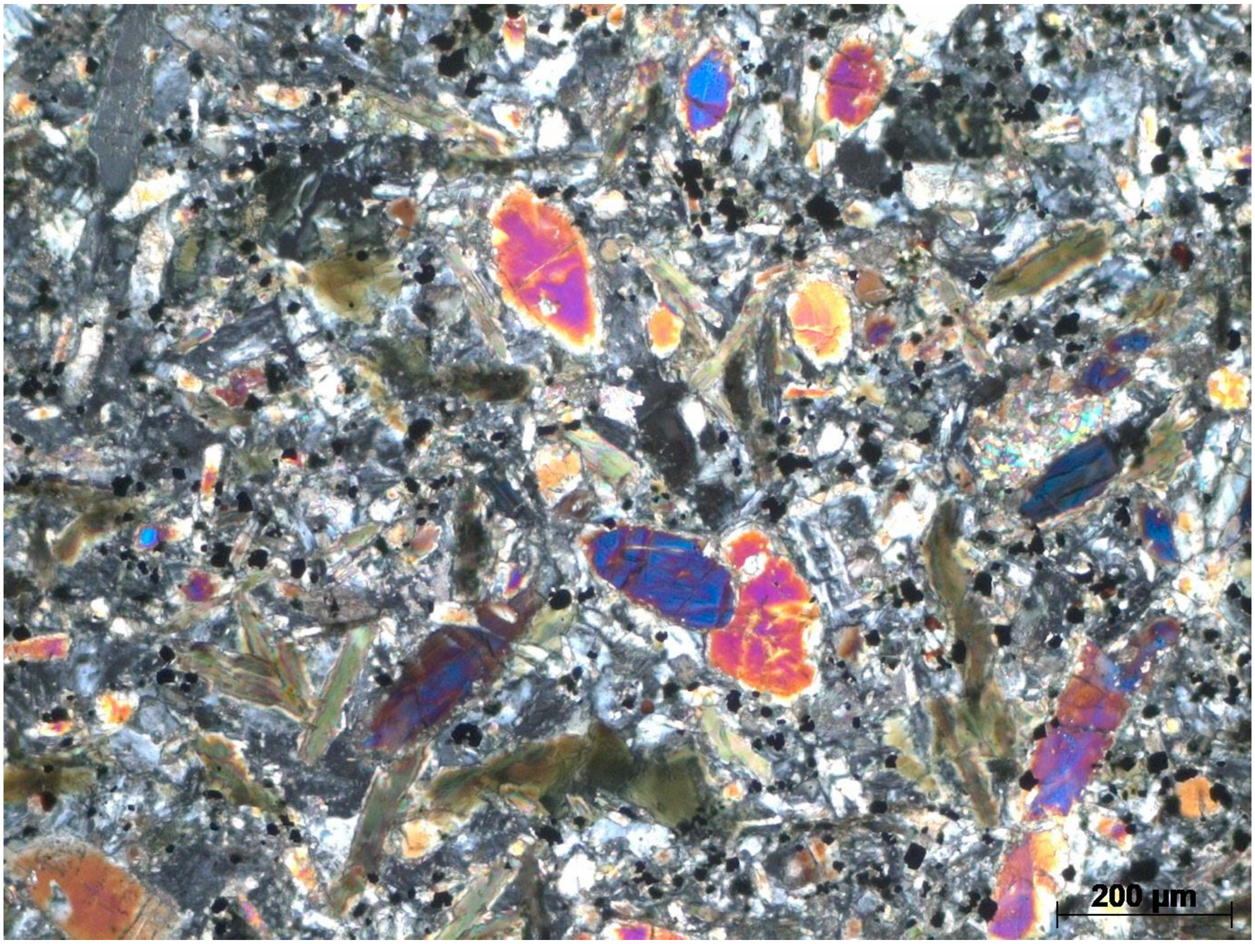
LT-6_24_72-24_8_5x_xpl_034	Alkaline Lamprophyre

Thin Section Image 34. The same image as thin section image 33 but taken under crossed-polarized light reveals high, second-order interference colors of clinopyroxene with vibrant purple, orange, blue, and yellow. Green and pink biotite is noticeable at lower-left-center. The groundmass appears darker with a serpentine, chlorite, uralite, and sericite composition. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



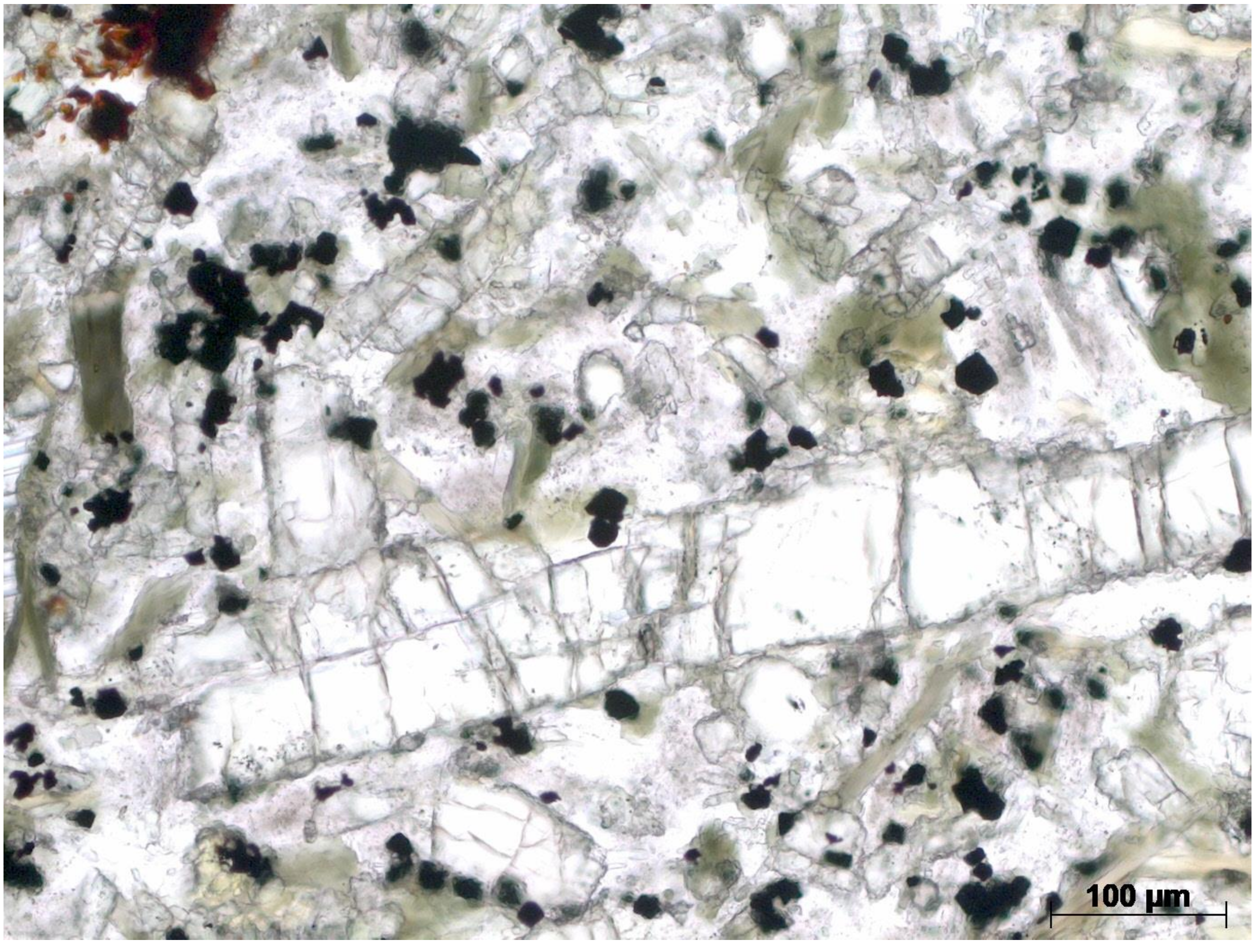
LT-6_24_72-24_8_10x_ppl_035	Alkaline Lamprophyre

Thin Section Image 35. More magnified view of the alkaline lamprophyre elongate, prismatic augite clinopyroxene (high-relief, colorless), green hornblende and biotite, and opaque magnetite hosted by a groundmass of sericite, serpentine, uralite, and chlorite. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



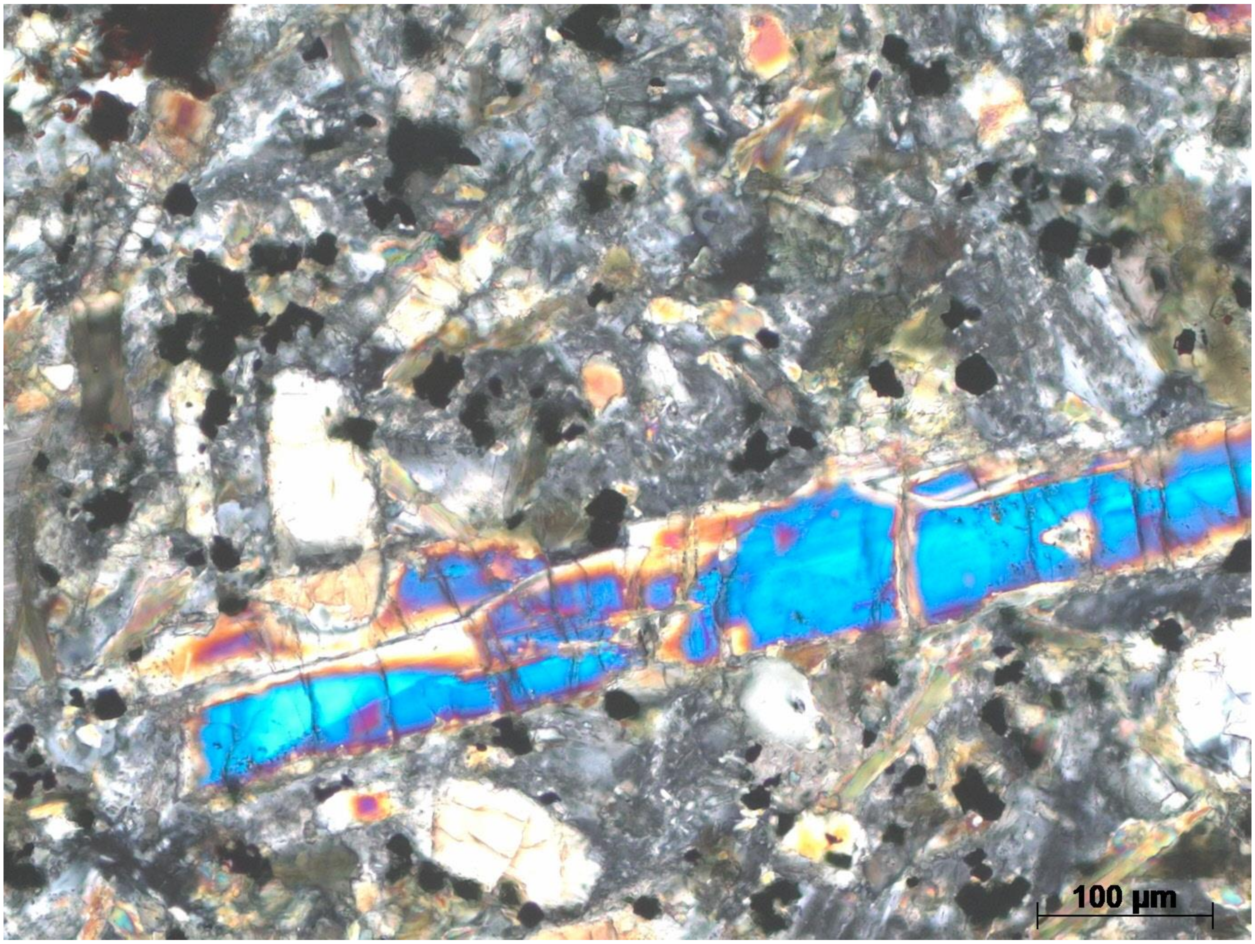
LT-6_24_72-24_8_10x_xpl_036	Alkaline Lamprophyre

Thin Section Image 36. The same view as in thin section 35 but taken under crossed-polarized light to show the bright second-order interference colors of the clinopyroxene. Hornblende remains a deep green and biotite shows a bright green and pink. The groundmass appears dark gray from abundant serpentine, uralite, and chlorite. Some remnants of bright white are from plagiolcase feldspar replaced with sericite. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



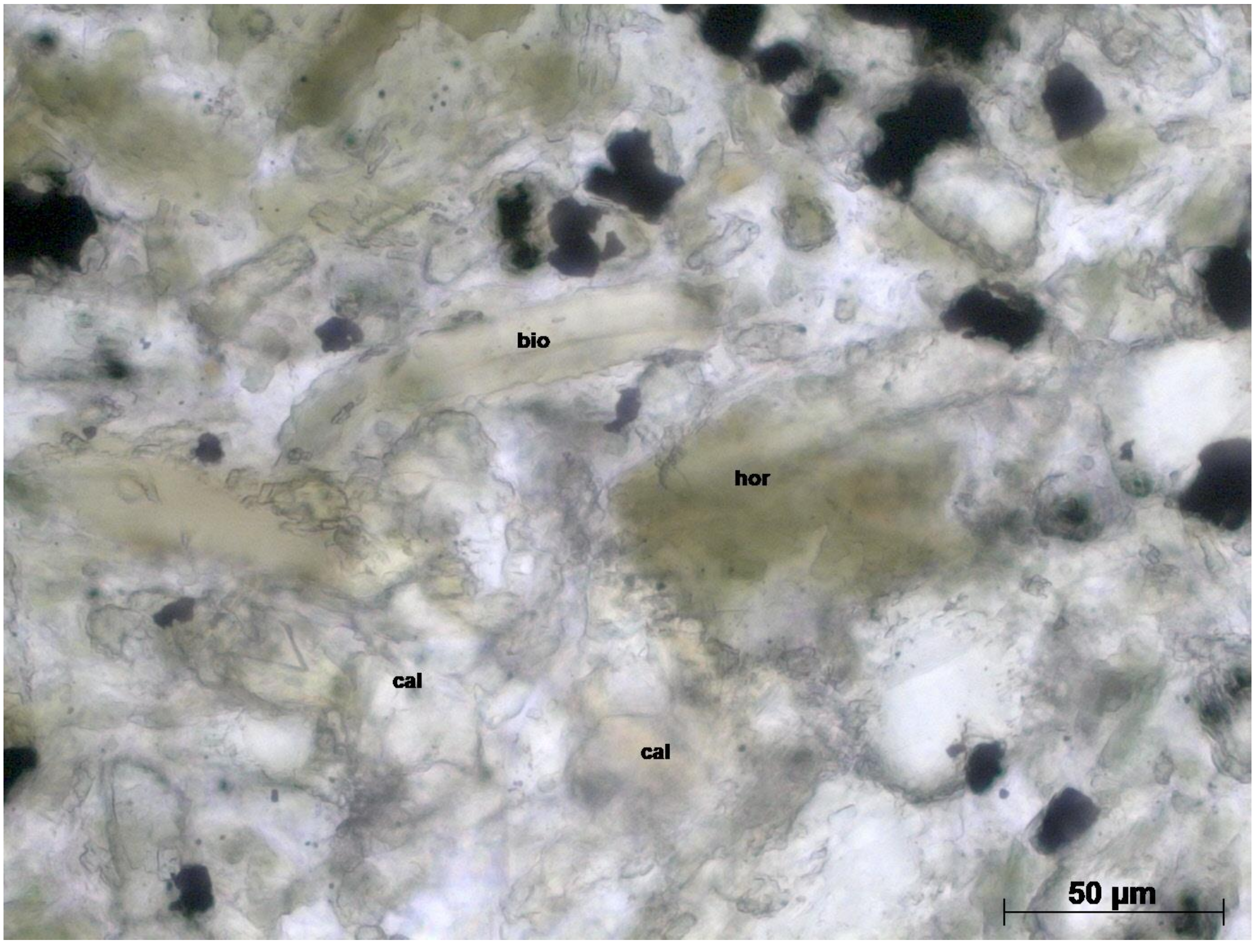
LT-6_24_72-24_8_20x_ppl_037	Alkaline Lamprophyre

Thin Section Image 37. Increased detail of the alkaline lamprophyre illustrates elongate, high-relief augite-clinopyroxene at center, green biotite and hornblende, and opaque magnetite in a colorless, low-relief groundmass of sericite, chlorite, uralite, and serpentine. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



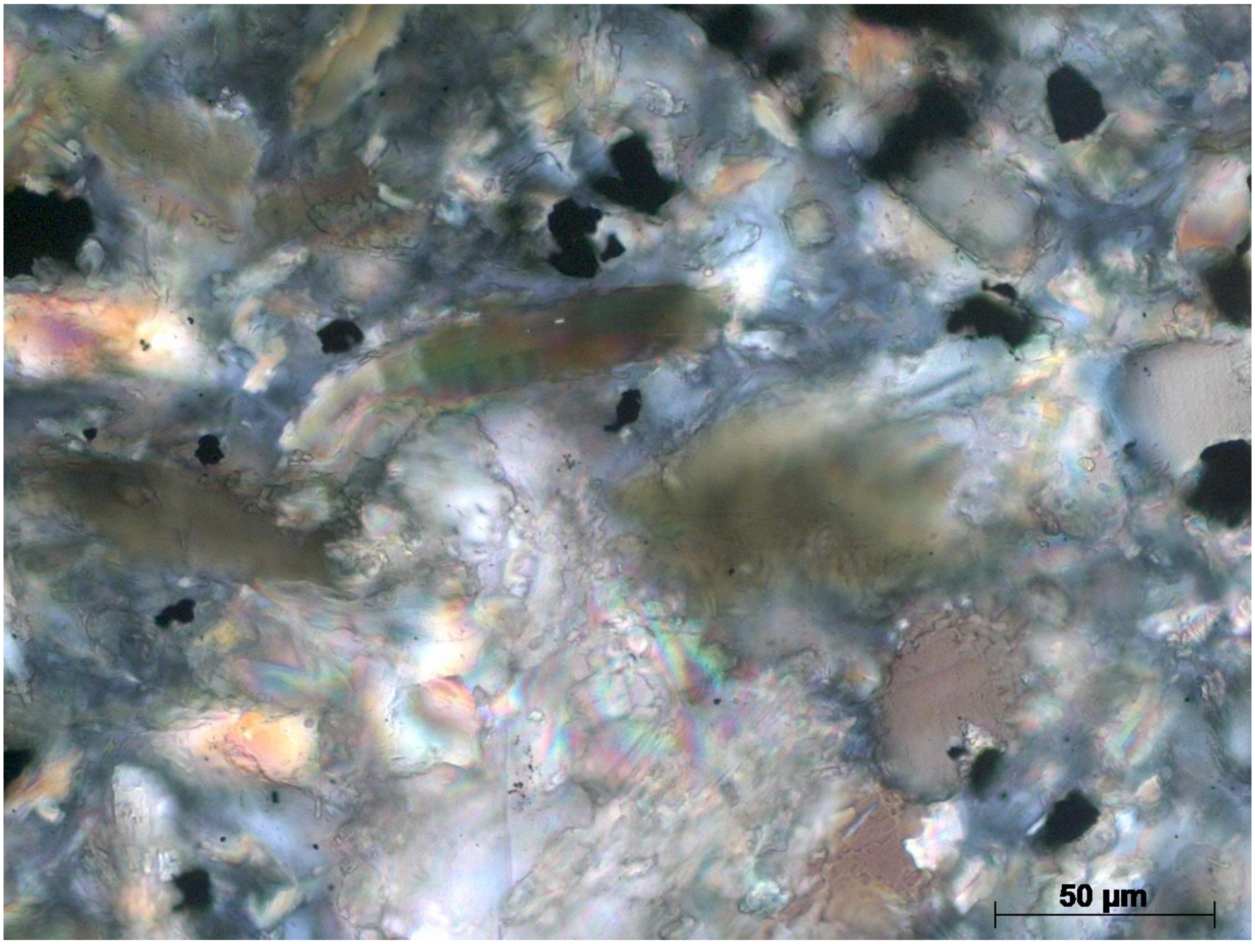
LT-6_24_72-24_8_20x_xpl_038	Alkaline Lamprophyre

Thin Section Image 38. The same view of thin section 37 but under crossed-polarized light illustrates the yellow, purple, and blue interference colors of augite-clinopyroxene. The altered areas the comprise the dark groundmass further illustrate sericite, uralite, and serpentine replacement. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



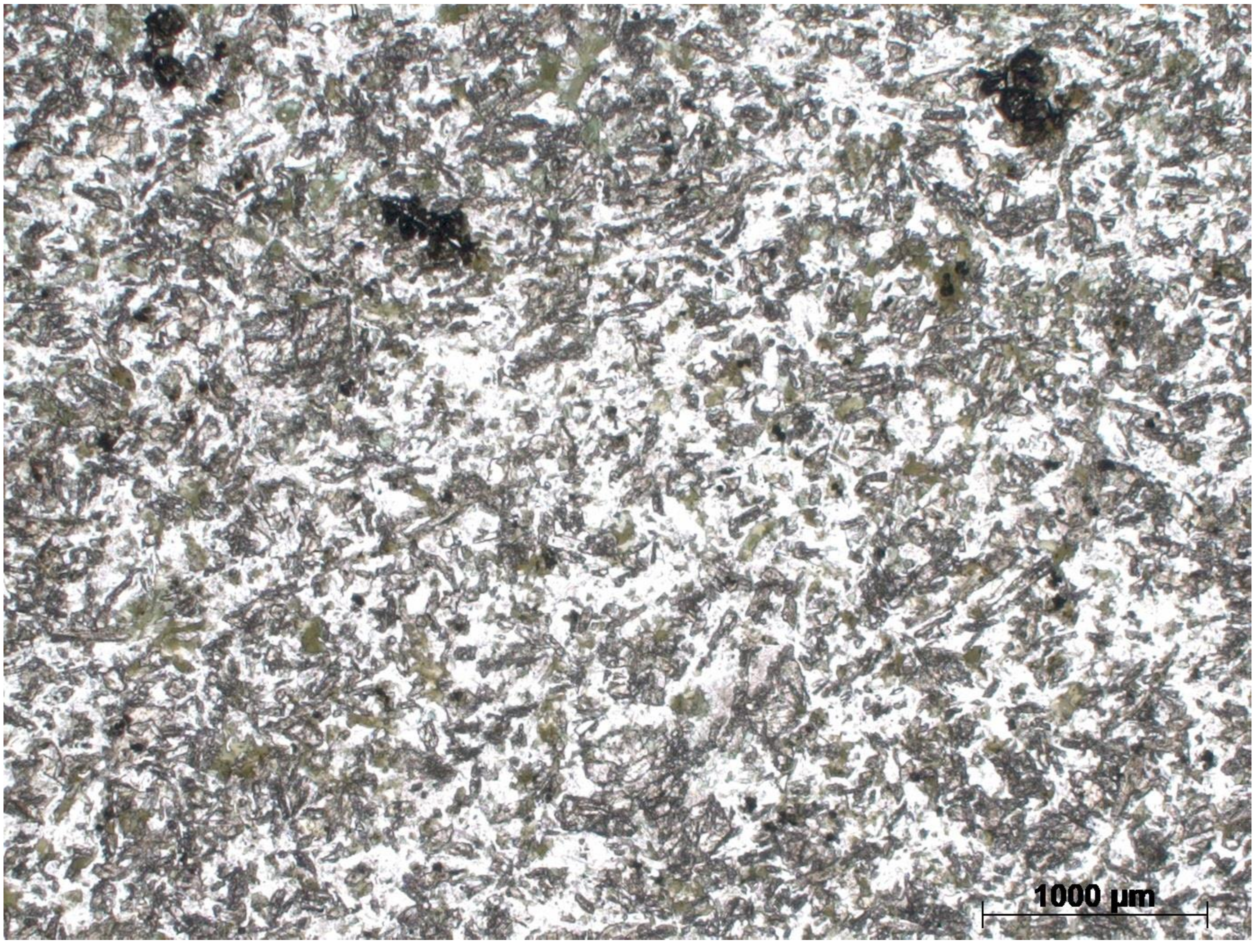
LT-6_24_72-24_8_50x_ppl_039	Alkaline Lamprophyre

Thin Section Image 39. Highest magnification view of the alkaline lamprophyre focusses on a patch of broken calcite cement (cal) that may indicate hydrothermal fluid activity and cement replacement. The surrounding biotite (bio) and hornblende (hor), as well as the opaque magnetite and finely-crystalline. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



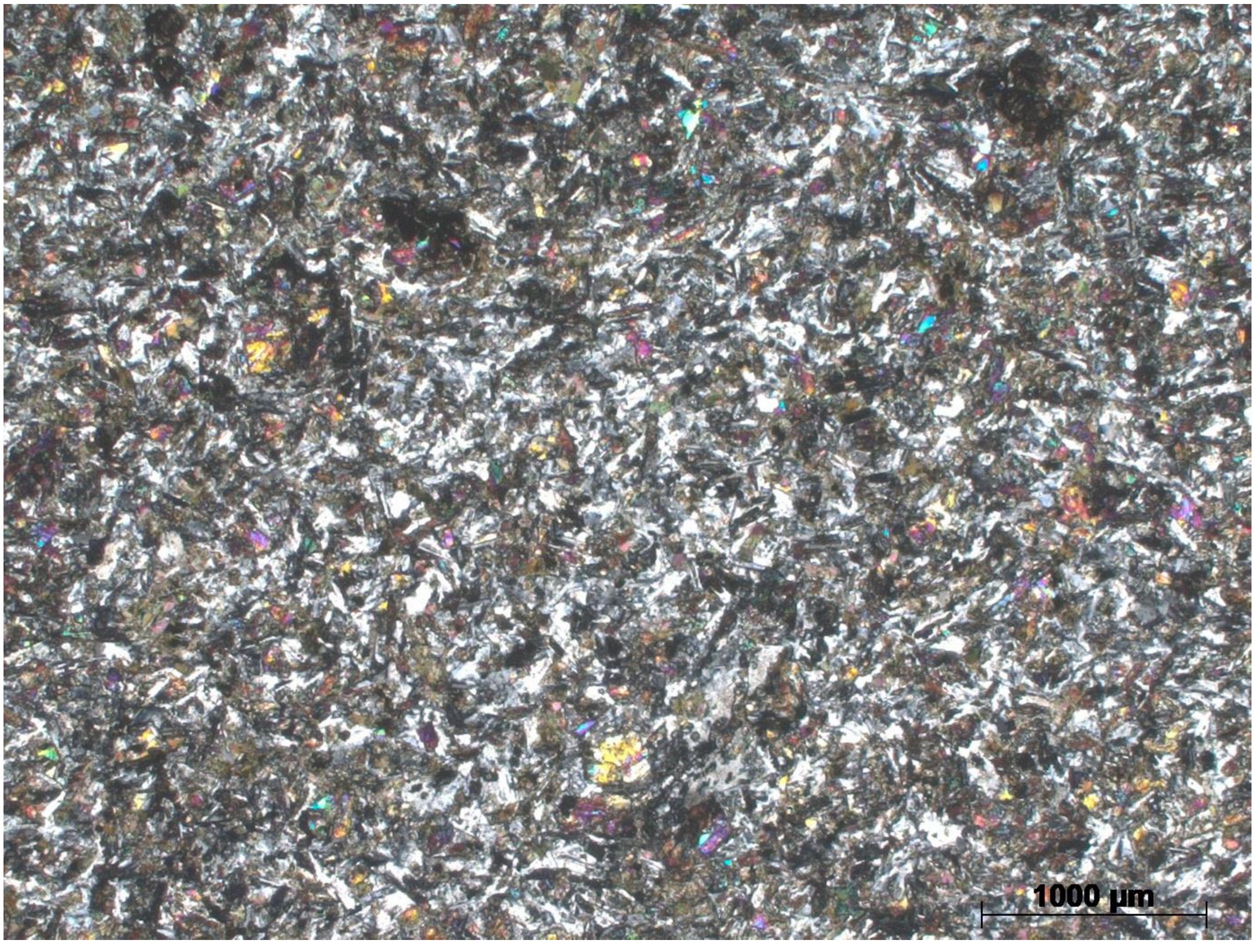
LT-6_24_72-24_8_50x_xpl_040	Alkaline Lamprophyre

Thin Section Image 40. The same image as thin section image 39 but under crossed-polarized light reveals dark green hornblende and biotite at center. Calcite shows brighter, high-order interference colors. The background serpentine, chlorite, and uralite groundmass shows a combination of low, first order white and yellow colors. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



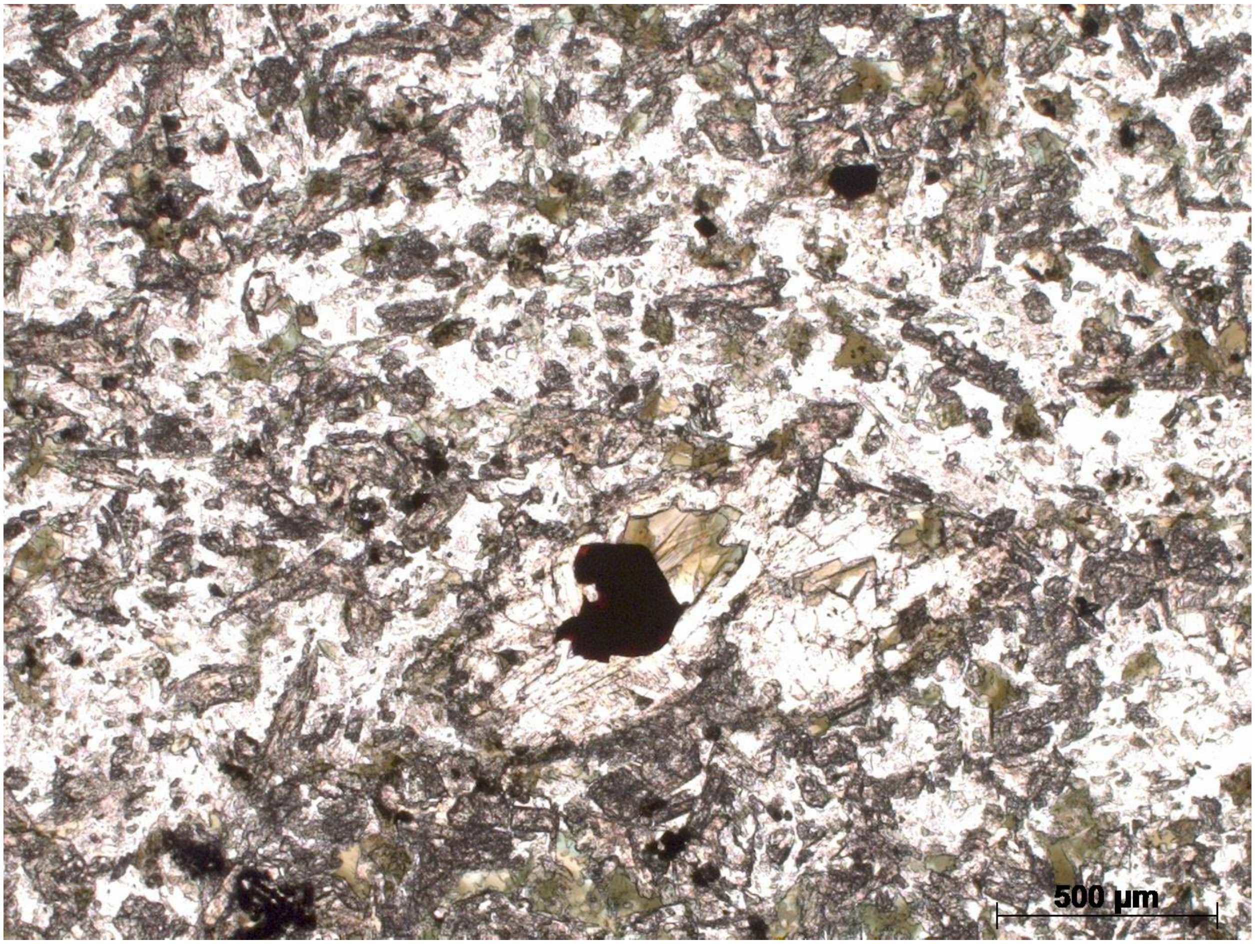
LT-7_11_13-11_22_2_5x_ppl_041	Alkaline Lamprophyre

Thin Section Image 41. Low magnification view of an alkaline lamprophyre illustrates abundant phenocrystals of plagioclase feldspar (white), dark gray augite, and green hornblende and biotite. A minor amount of opaque magnetite is widely distributed throughout the groundmass. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



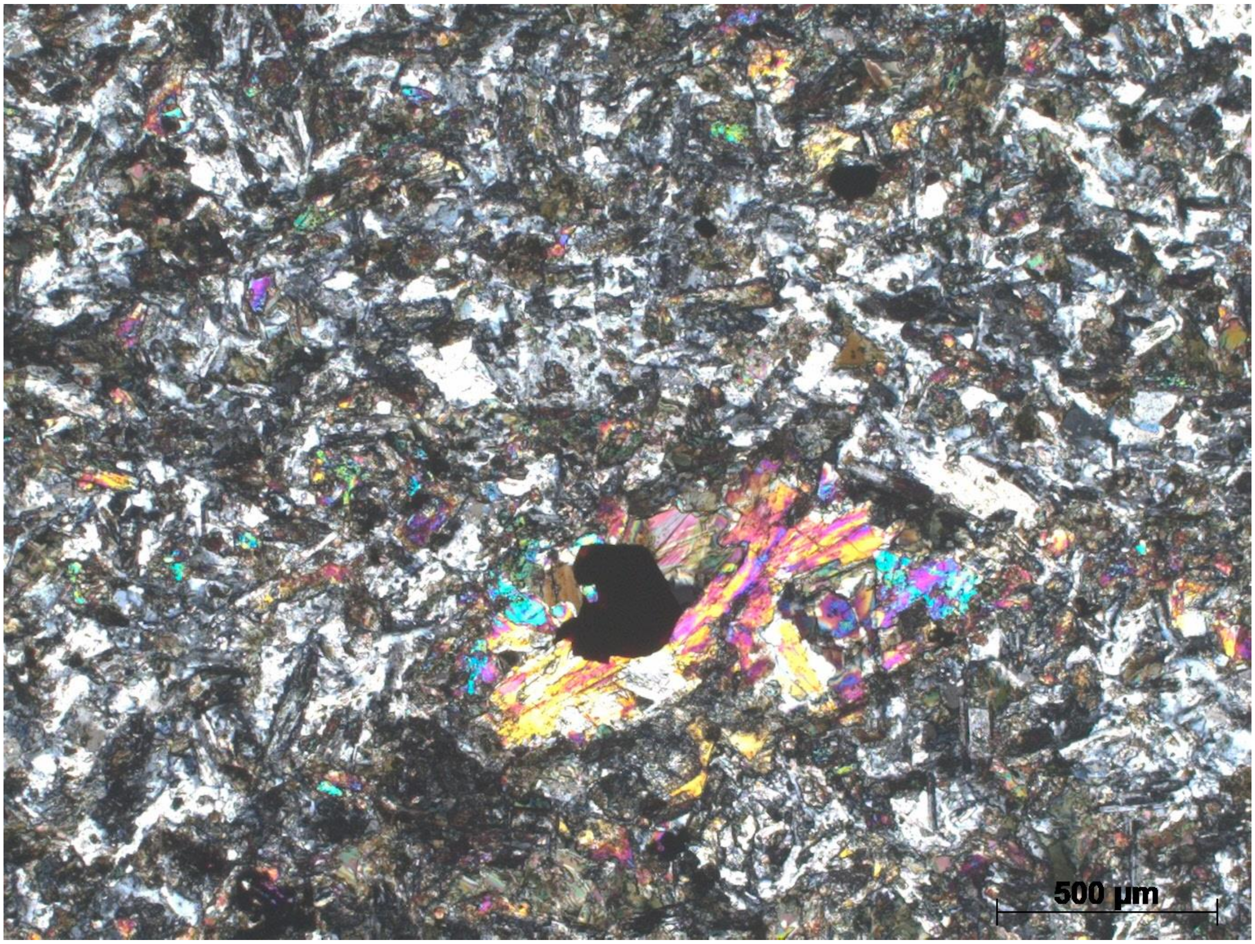
LT-7_11_13-11_22_2_5x_xpl_042	Alkaline Lamprophyre

Thin Section Image 42. The same view as image 41 but under crossed-polars reveals subtle polysynthetic twinning of the plagioclase feldspar and bright, second-order interference colors among the augite-clinopyroxene with yellow, blue, pink, and purple interference colors. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



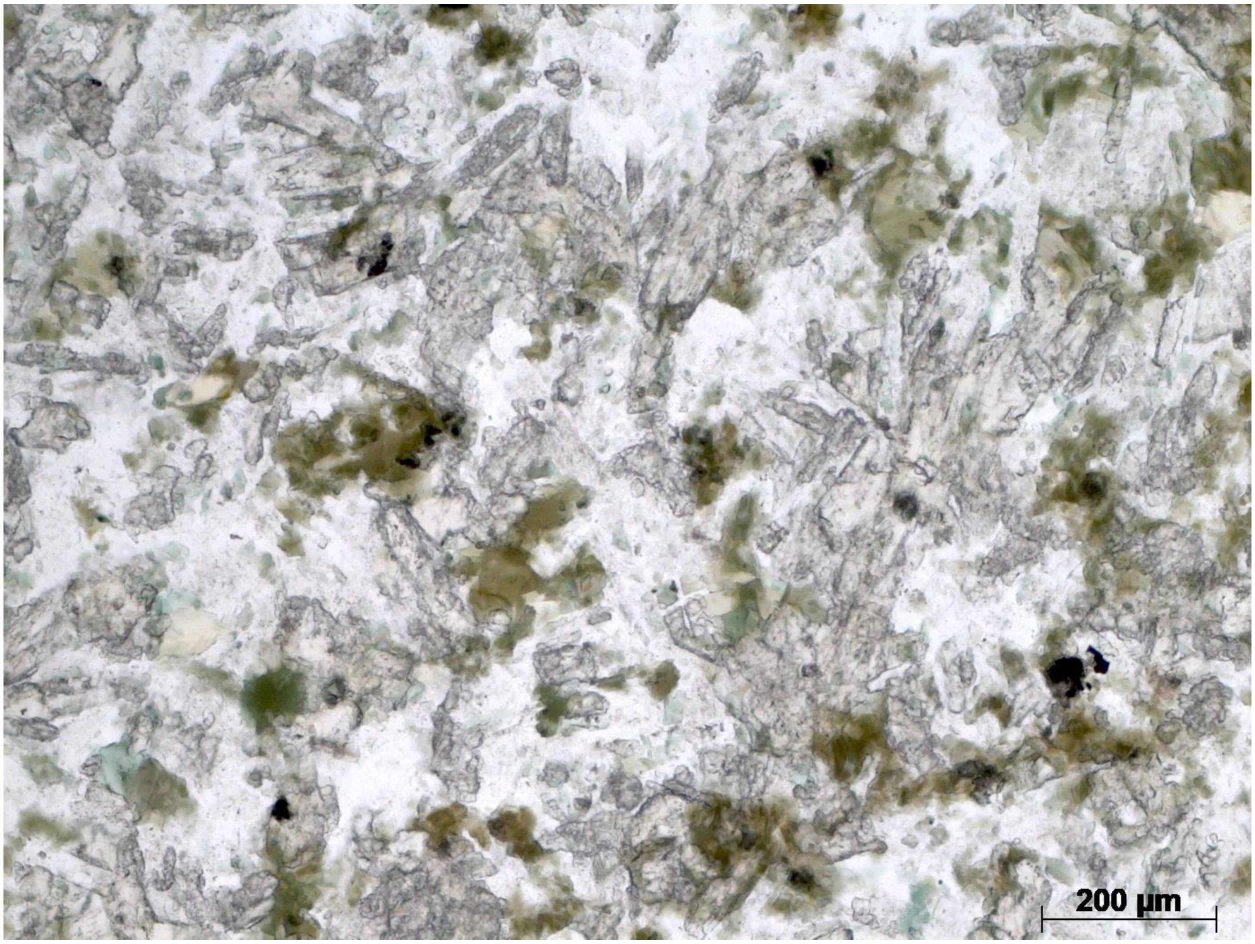
LT-7_11_13-11_22_5x_ppl_043	Alkaline Lamprophyre

Thin Section Image 43. Increased magnification view of the alkaline lamprophyre reveals white plagioclase feldspar phenocrystals among dark gray, high-relief augite-clinopyroxene phenocrysts. Green hornblende admixed with pleochroic biotite, as well as opaque magnetite are widely dispersed among the matrix. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



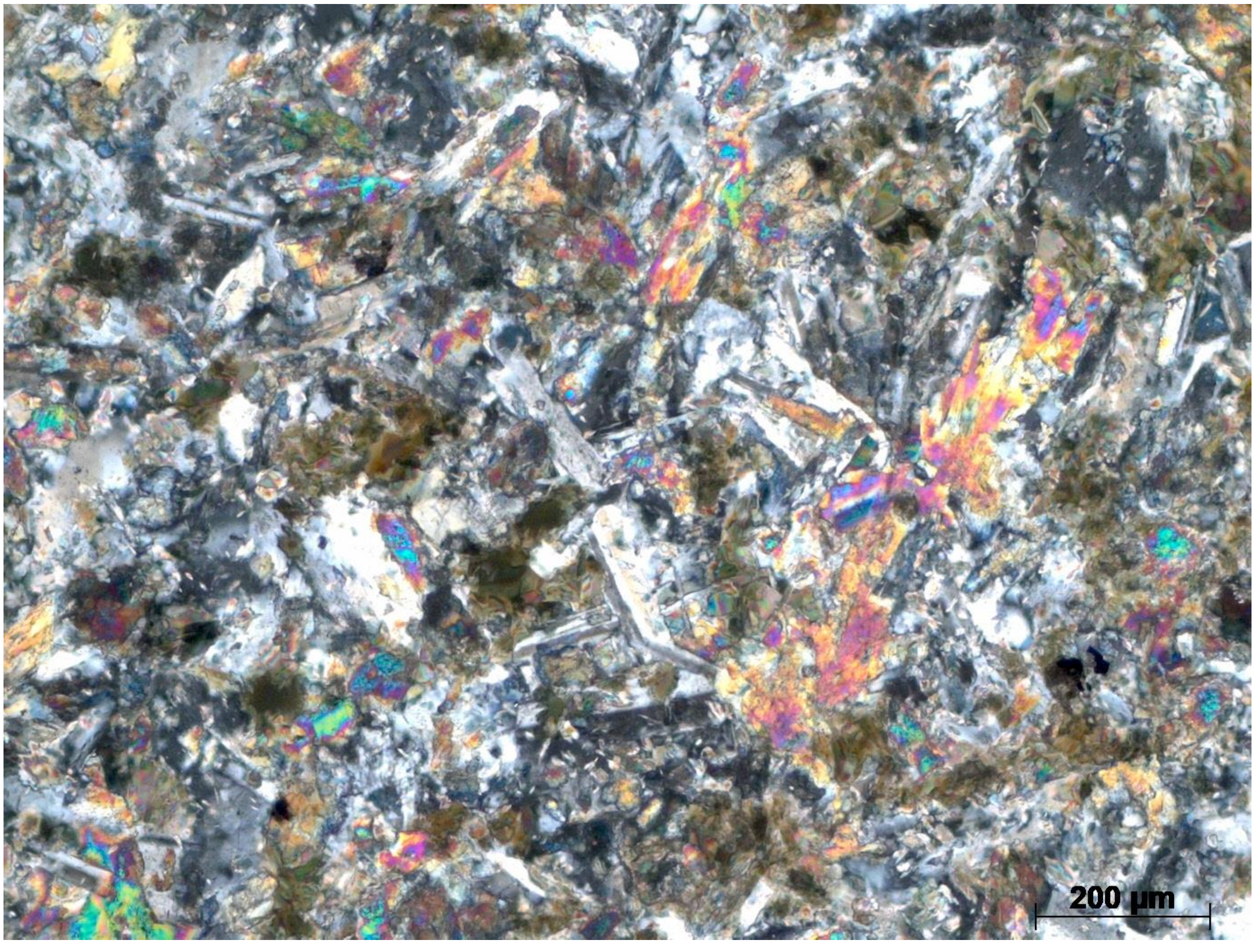
LT-7_11_13-11_22_5x_xpl_044	Alkaline Lamprophyre

Thin Section Image 44. The same image as thin section image 43 but taken under crossed-polarized light illustrates high second-order interference colors of augite-clinopyroxene, as well as polysynthetic twinning and low, first-order gray and white interference colors of plagiolcase feldspar. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



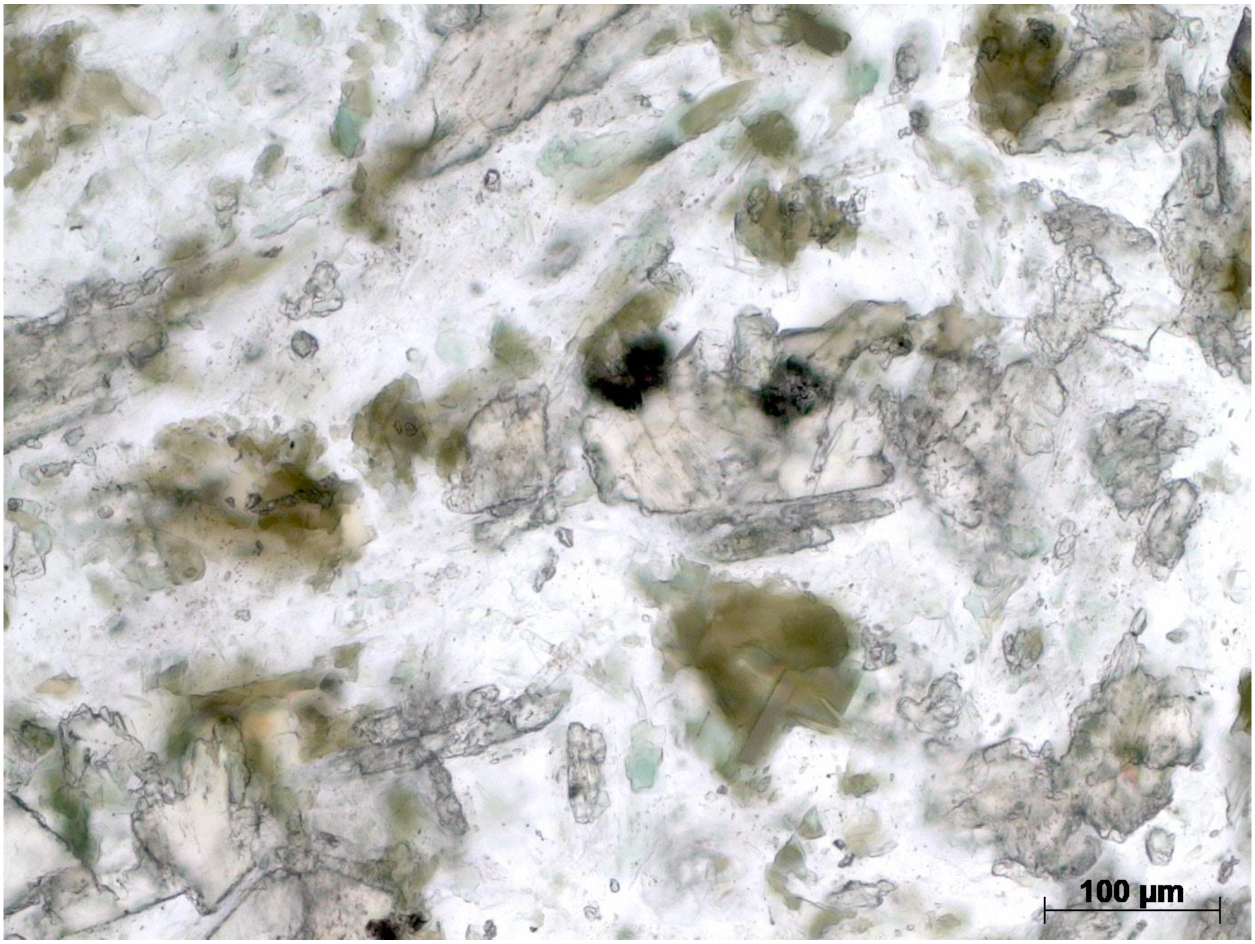
LT-7_11_13-11_22_10x_ppl_045	Alkaline Lamprophyre

Thin Section Image 45. More magnified view of the alkaline lamprophyre reveals a combination of low-relief plagiolcase feldspar (white), high-relief augite clinopyroxene (gray), green hornblende and biotite, and opaque magnetite that is closely associated with the hornblende. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



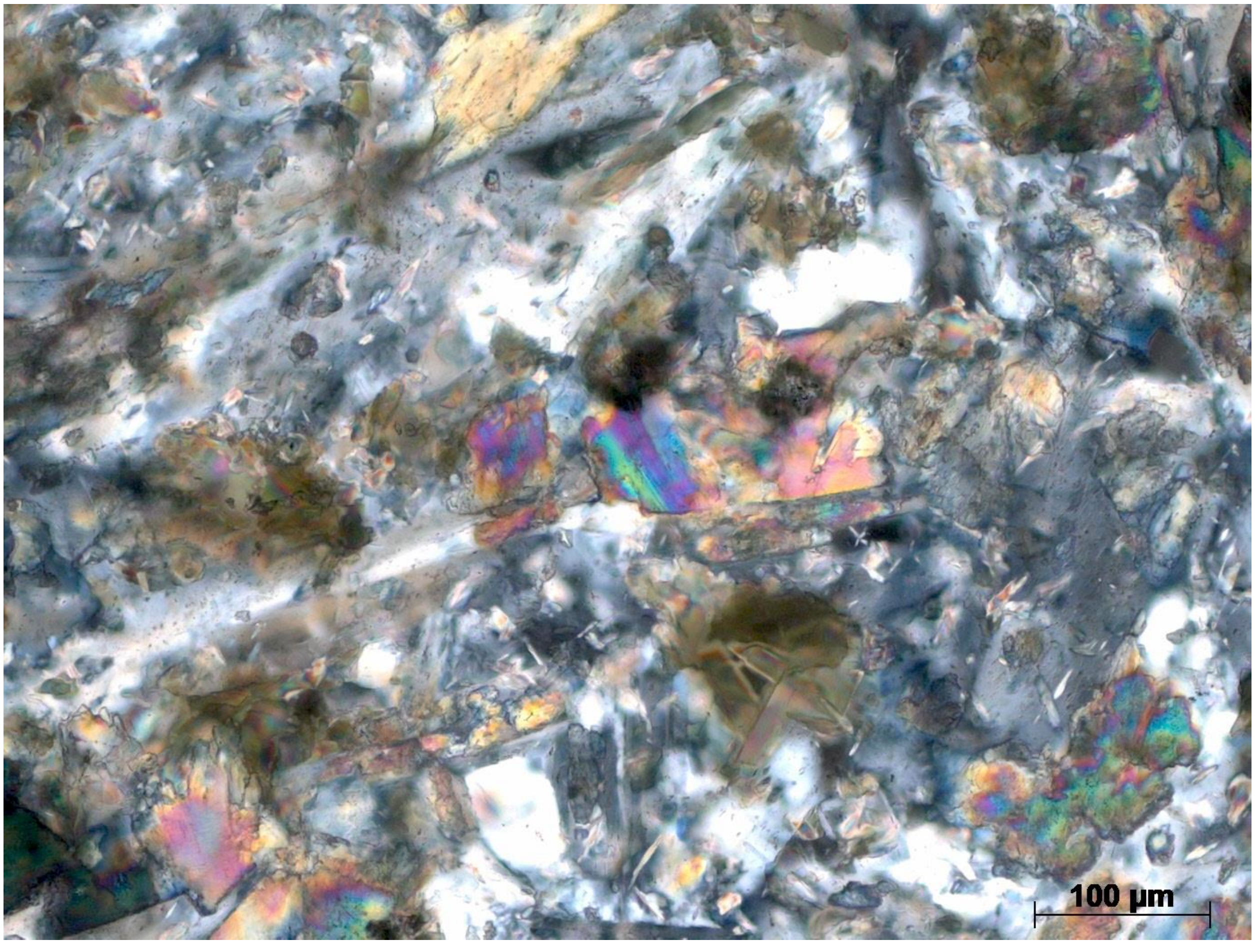
LT-7_11_13-11_22_10x_xpl_046	Alkaline Lamprophyre

Thin Section Image 46. The same view as in thin section 45 but taken under crossed-polarized light to reveal the bright second-order interference colors of the clinopyroxene, the bright sericite replacement and polysynthetic twinning of the plagiolcase feldspars, and the deep green of the hornblende. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



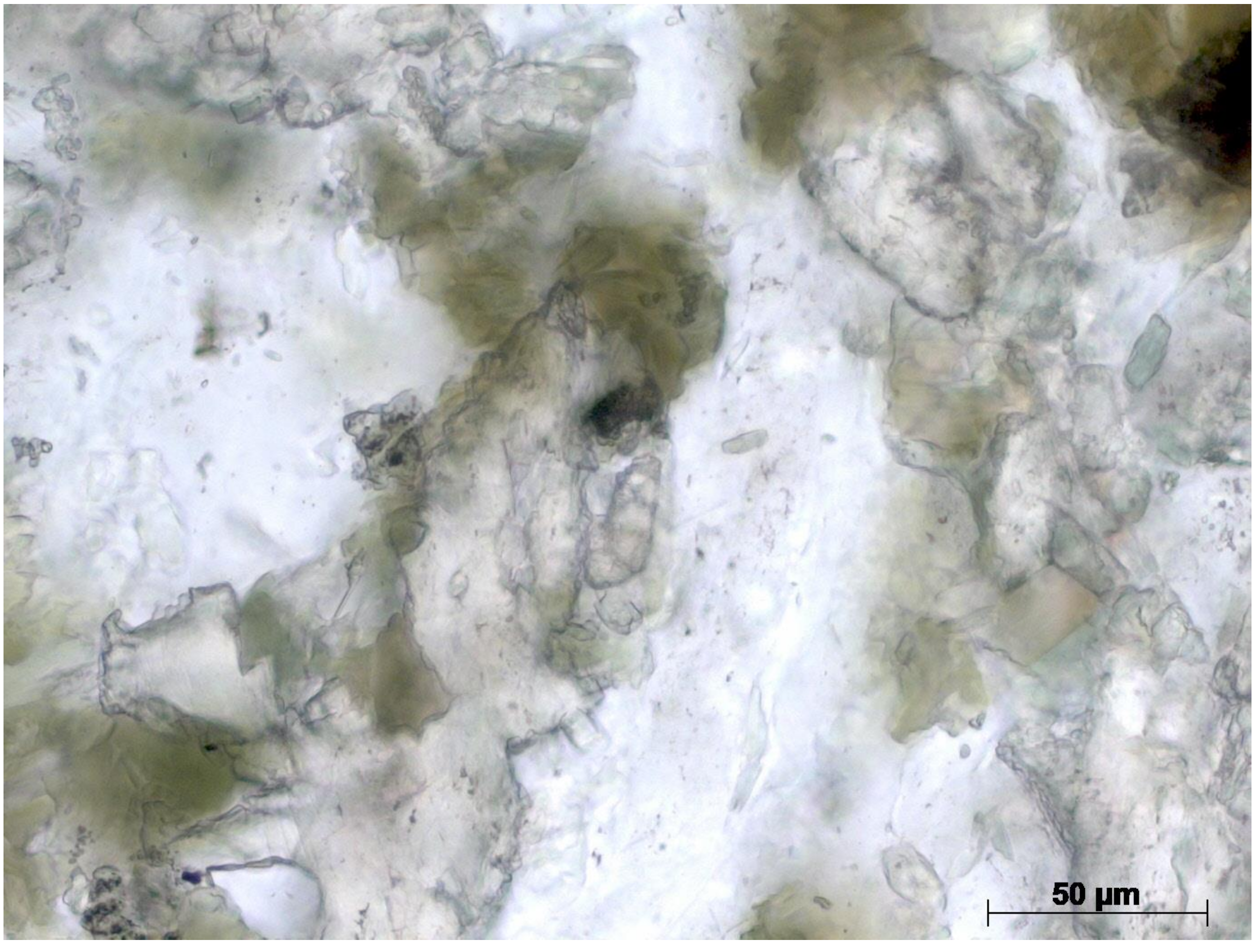
LT-7_11_13-11_22_20x_ppl_047	Alkaline Lamprophyre

Thin Section Image 47. Detailed view of the alkaline lamprophyre illustrates low-relief plagiolcase feldspar that hosts phenocrysts of high-relief augite-clinopyroxene, green hornblende, and opaque magnetite. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



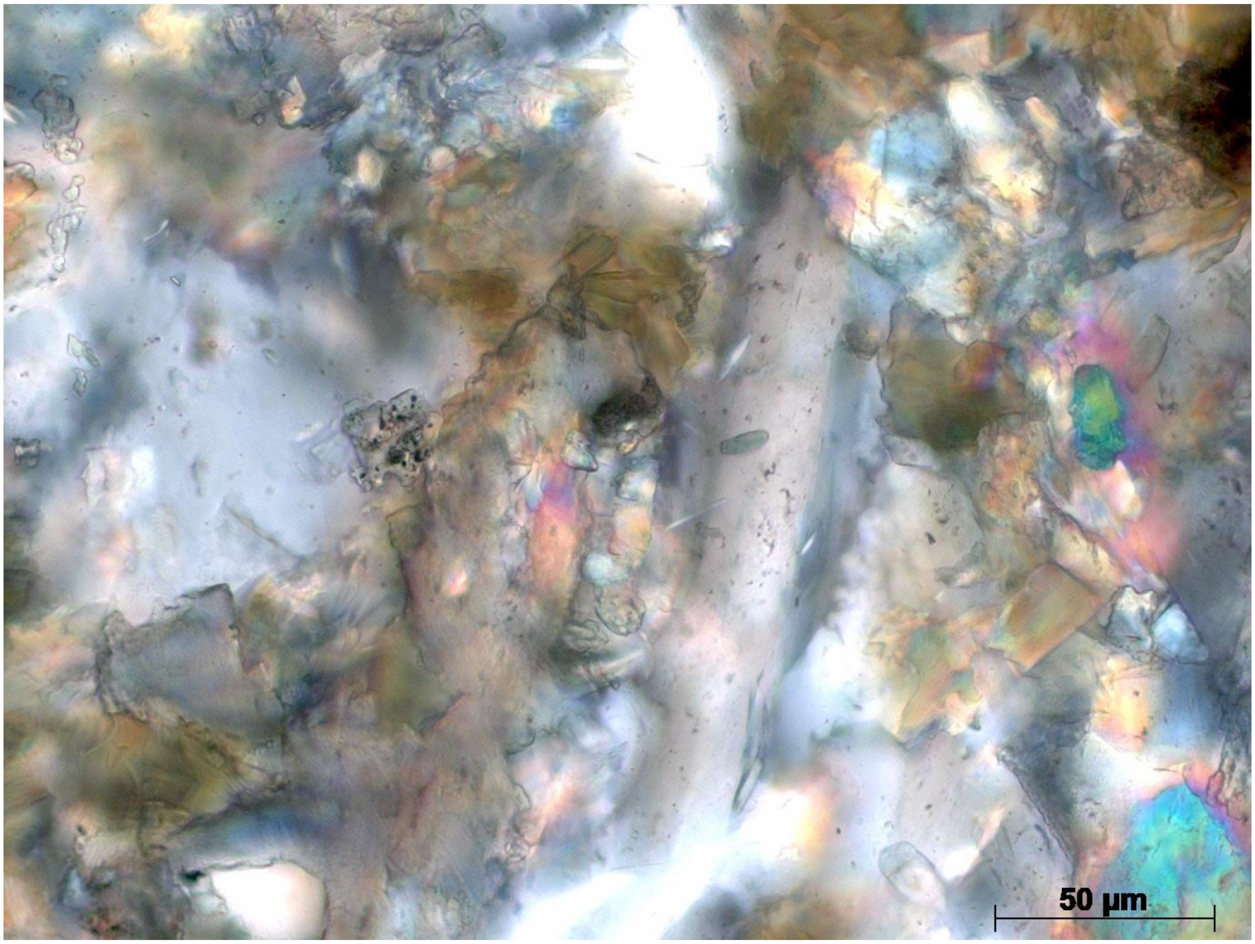
LT-7_11_13-11_22_20x_xpl_048	Alkaline Lamprophyre

Thin Section Image 48. The same view of thin section 47 but under crossed-polarized light reveals bright, second-order yellow, purple, green, blue, and pink of augite-clinopyroxene among the low, first order gray and white interference colors of plagioclase feldspar and deep green hornblende. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



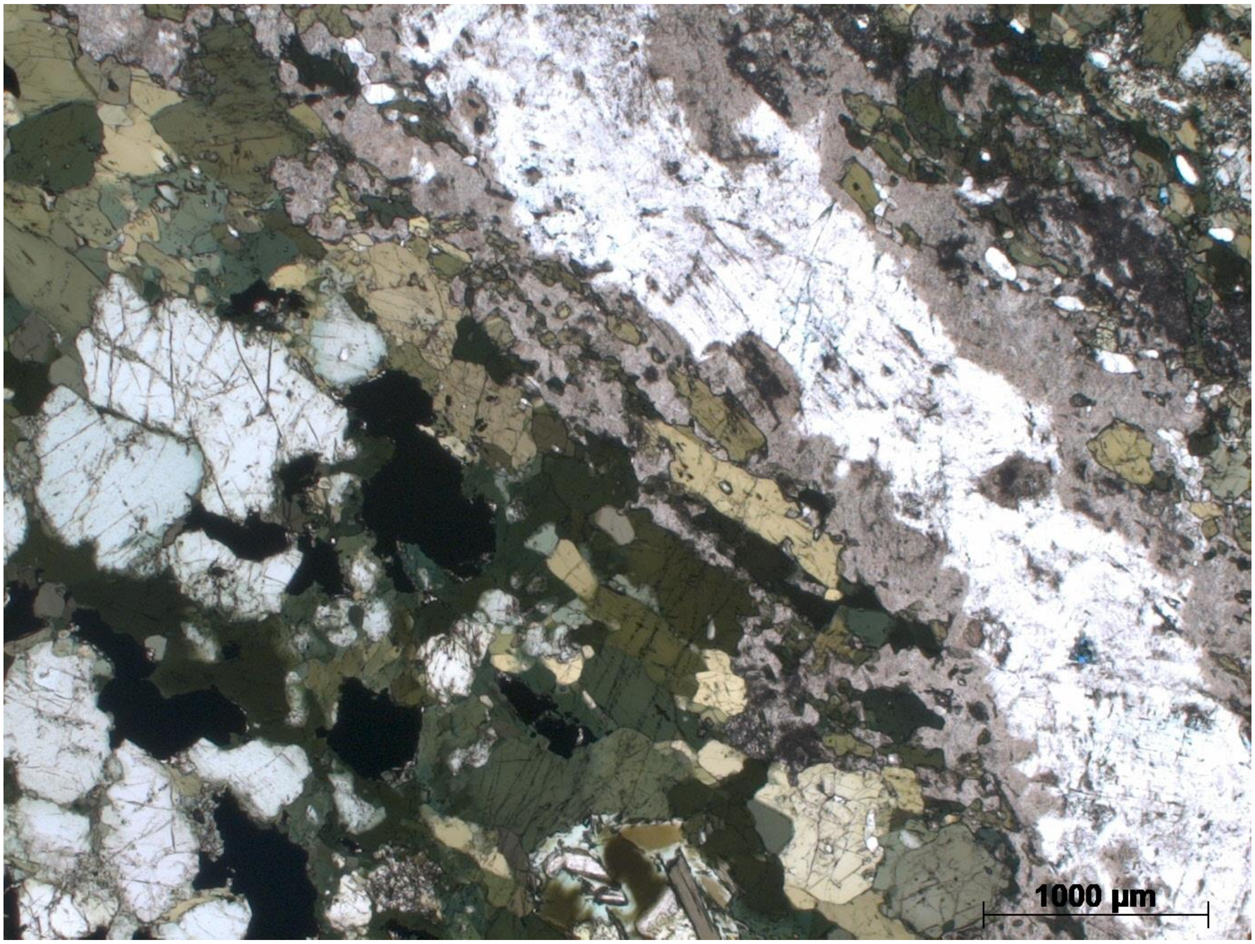
LT-7_11_13-11_22_50x_ppl_049	Alkaline Lamprophyre

Thin Section Image 49. Highest magnification view of the alkaline lamprophyre better illustrates the low-relief, white plagiolcase feldspar among phenocrysts of high-relief augite-clinopyroxene and green hornblende. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



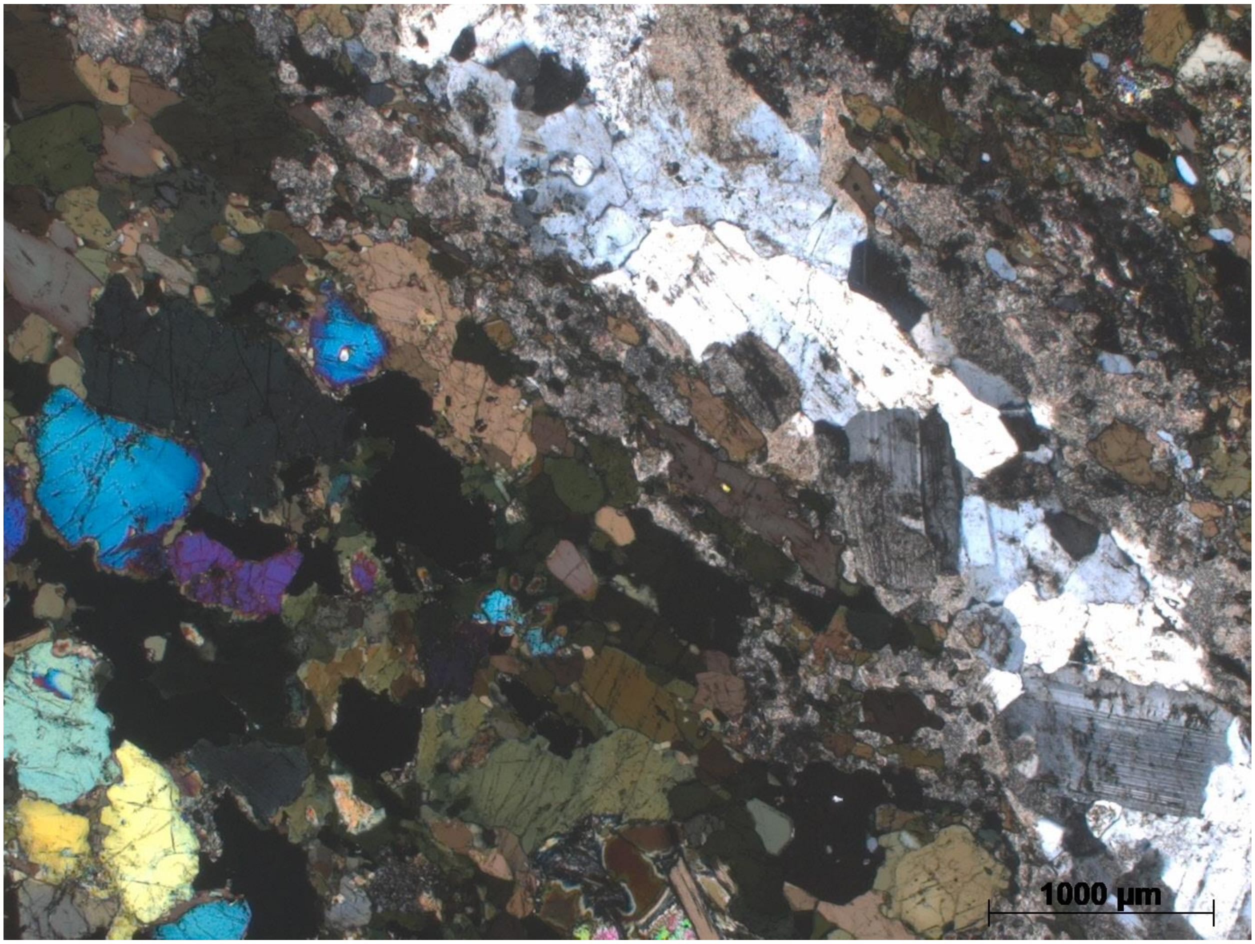
LT-7_11_13-11_22_50x_xpl_050	Alkaline Lamprophyre

Thin Section Image 50. The same image as thin section image 49 but under crossed-polarized light reveals bright, second order interference colors among the augite-clinopyroxene and replacive sericite among some of the plagiolcase feldspar crystals. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



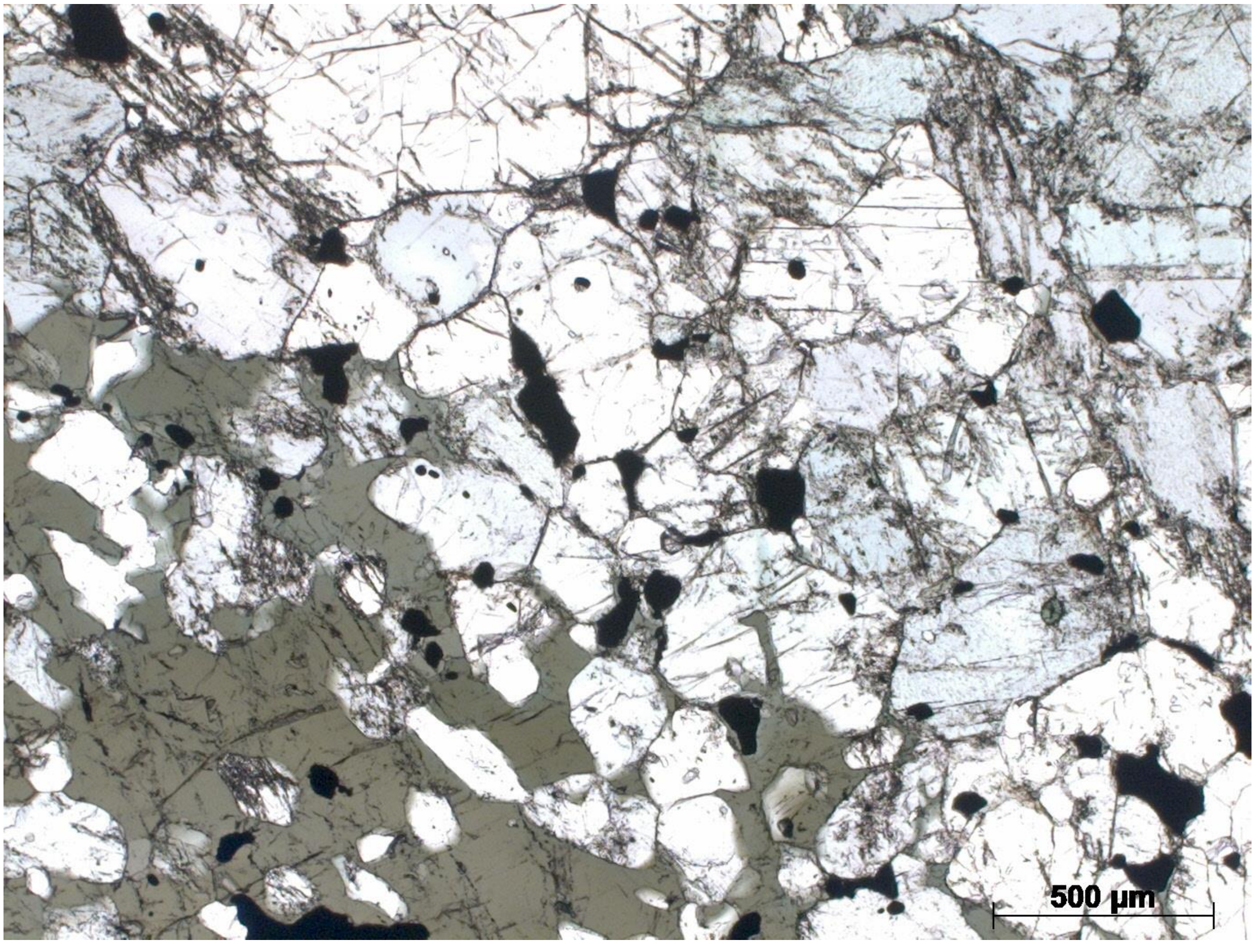
LT-8_16_41-16_5_2_5x_ppl_051	Olivine Gabbro

Thin Section Image 51. Low magnification view of an olivine gabbro illustrates olivine and clinopyroxene phenocrysts at lower-left (white), as well pale-to-dark green hornblende and pleochroic biotite. At right, a white vein cuts across the sample and is filled with low-relief calcic plagioclase and orthoclase. The medium gray edges of the vein are sericite mineral alterations of the feldspar. Opaque magnetite is also common. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



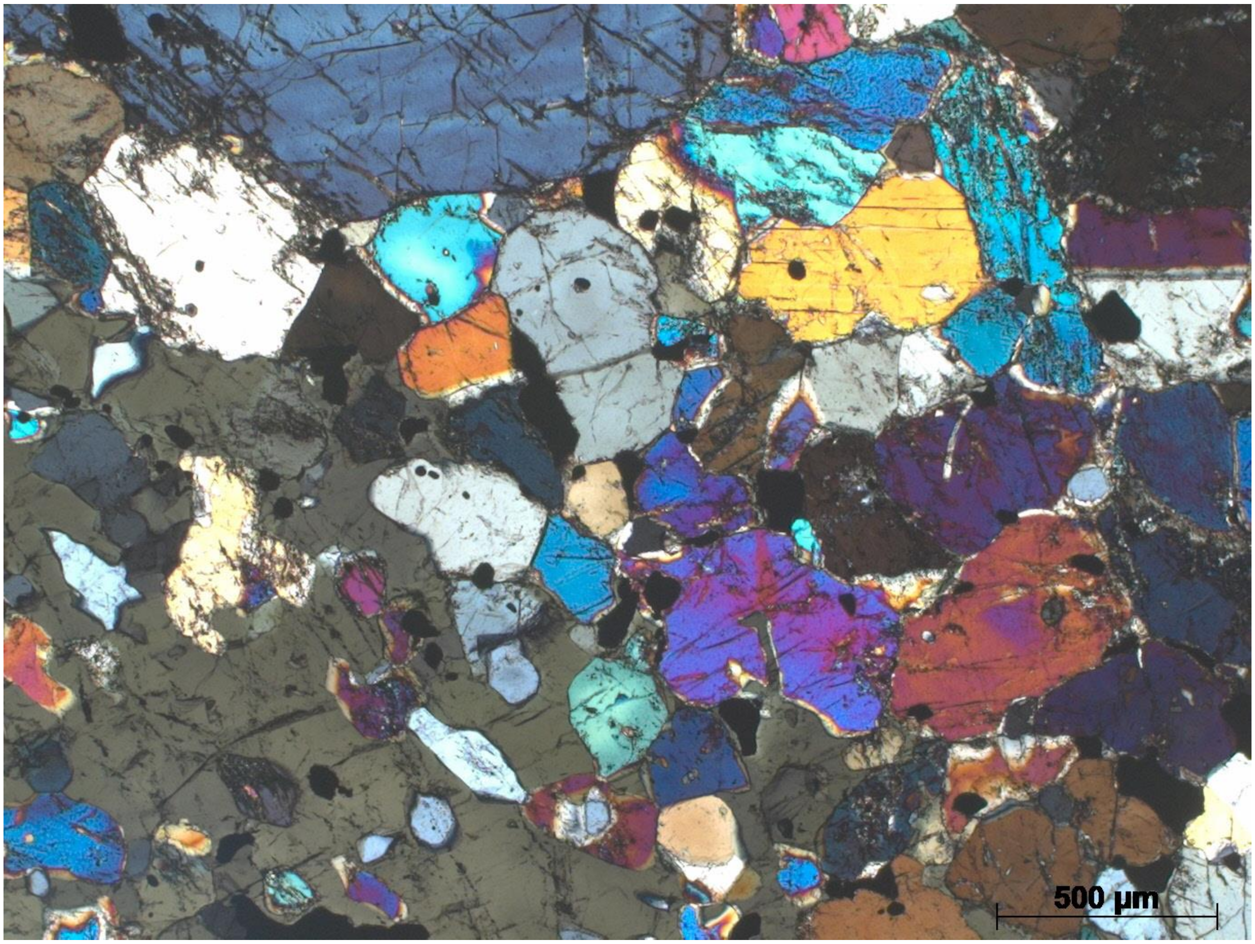
LT-8_16_41-16_5_2_5x_xpl_052	Olivine Gabbro

Thin Section Image 52. The same photo as in thin section image 51 but taken under crossed-polarized light reveals bright, upper-second order interference colors of the olivine phenocrysts at lower-left adjacent to dark green olivine and opaque magnetite. Note the polysynthetic twinning among the plagioclase feldspar vein-fill. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



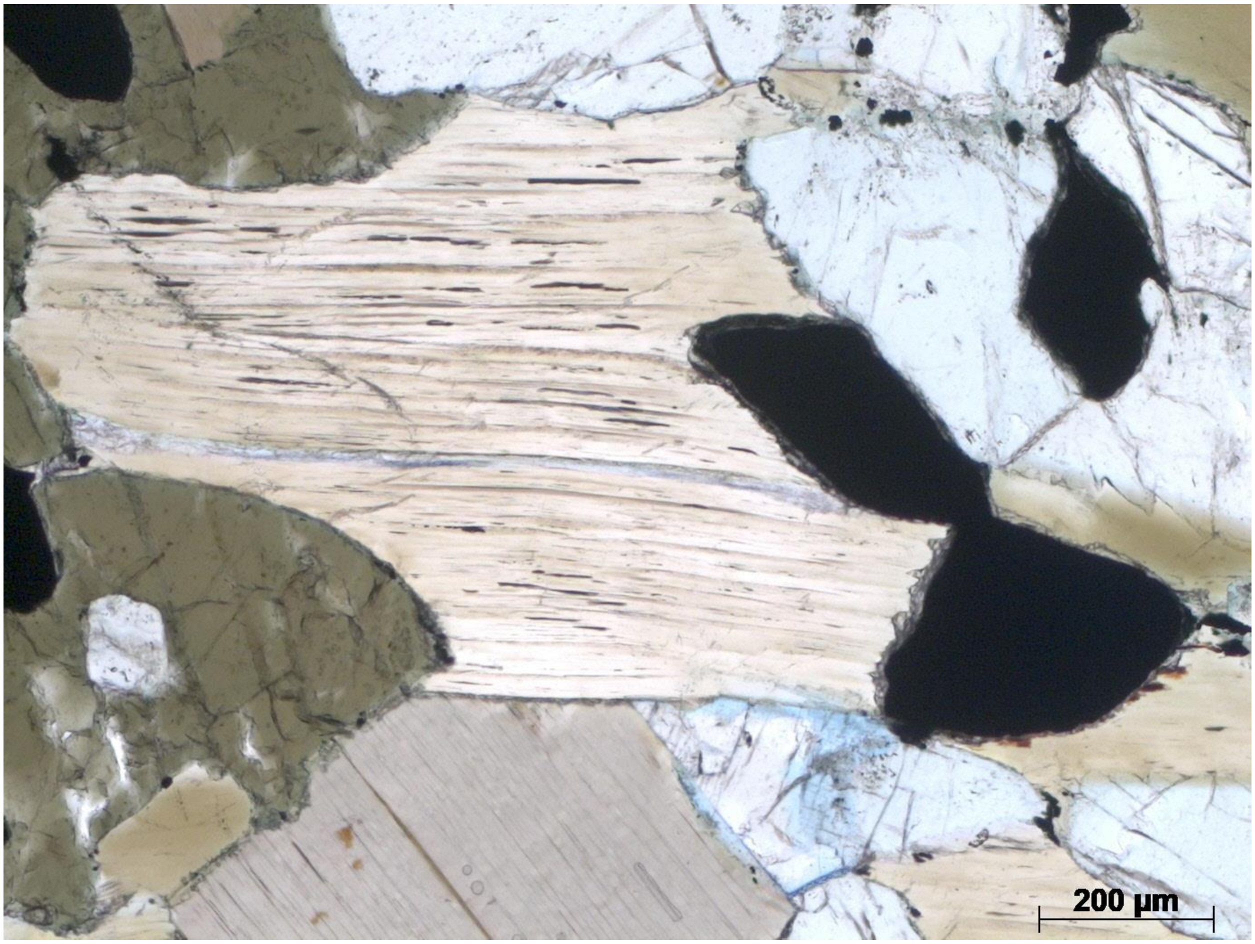
LT-8_16_41-16_5_5x_ppl_053	Olivine Gabbro

Thin Section Image 53. Increased magnification view of the olivine gabbro reveals high-relief, colorless, finely-crystalline olivine phenocrysts, along with coarsely-crystalline augite-clinopyroxene at top and right, and dark green hornblende at lower-left. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



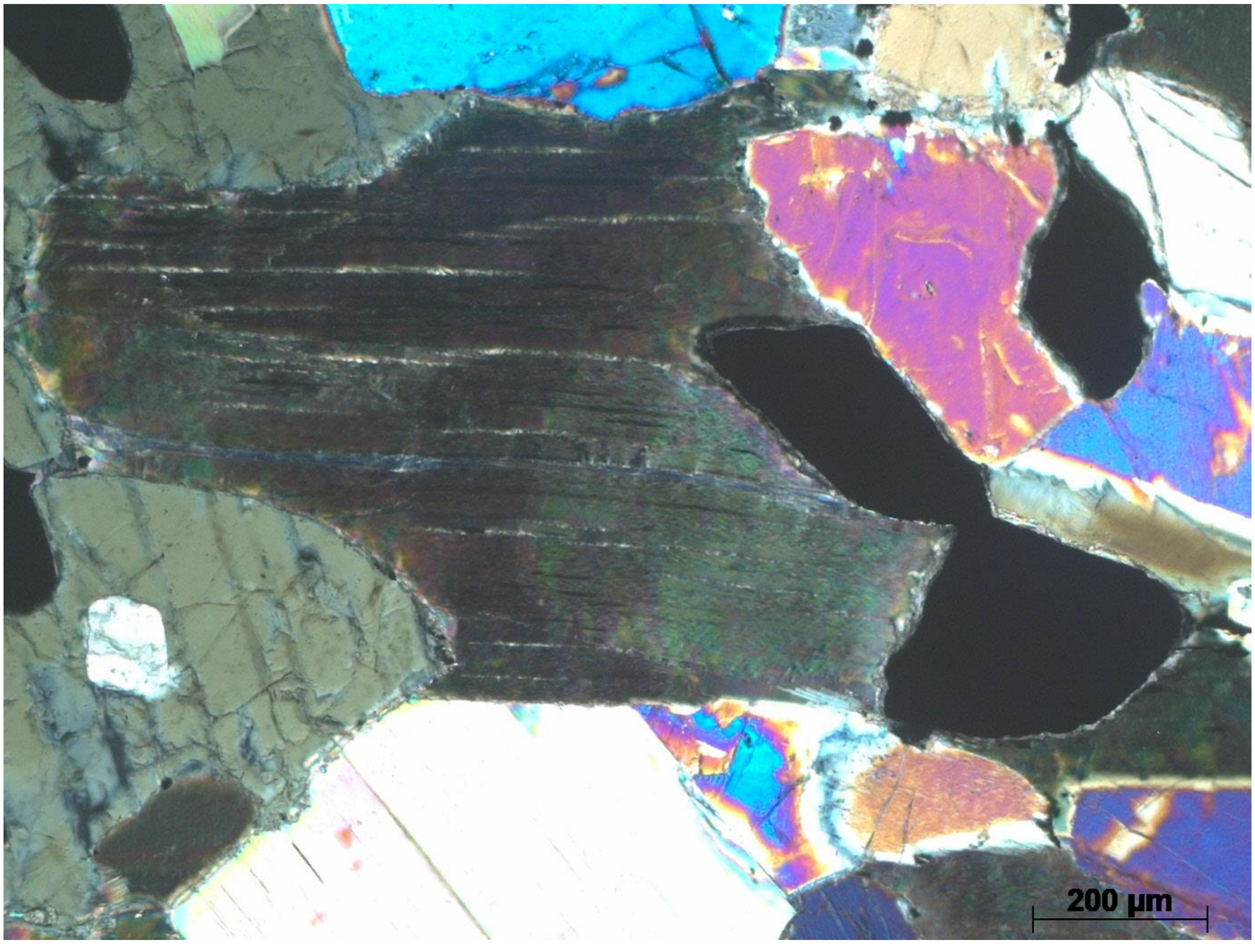
LT-8_16_41-16_5_5x_xpl_054	Olivine Gabbro

Thin Section Image 54. The same image as thin section image 53 but taken under crossed-polarized light illustrates bright, upper second-order interference colors of the olivine with vibrant yellow, blue, violet, green, and orange visible among the smaller phenocrysts. The hornblende at lower-left remains a dark green with interference colors masked by the deep color of the mineral. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



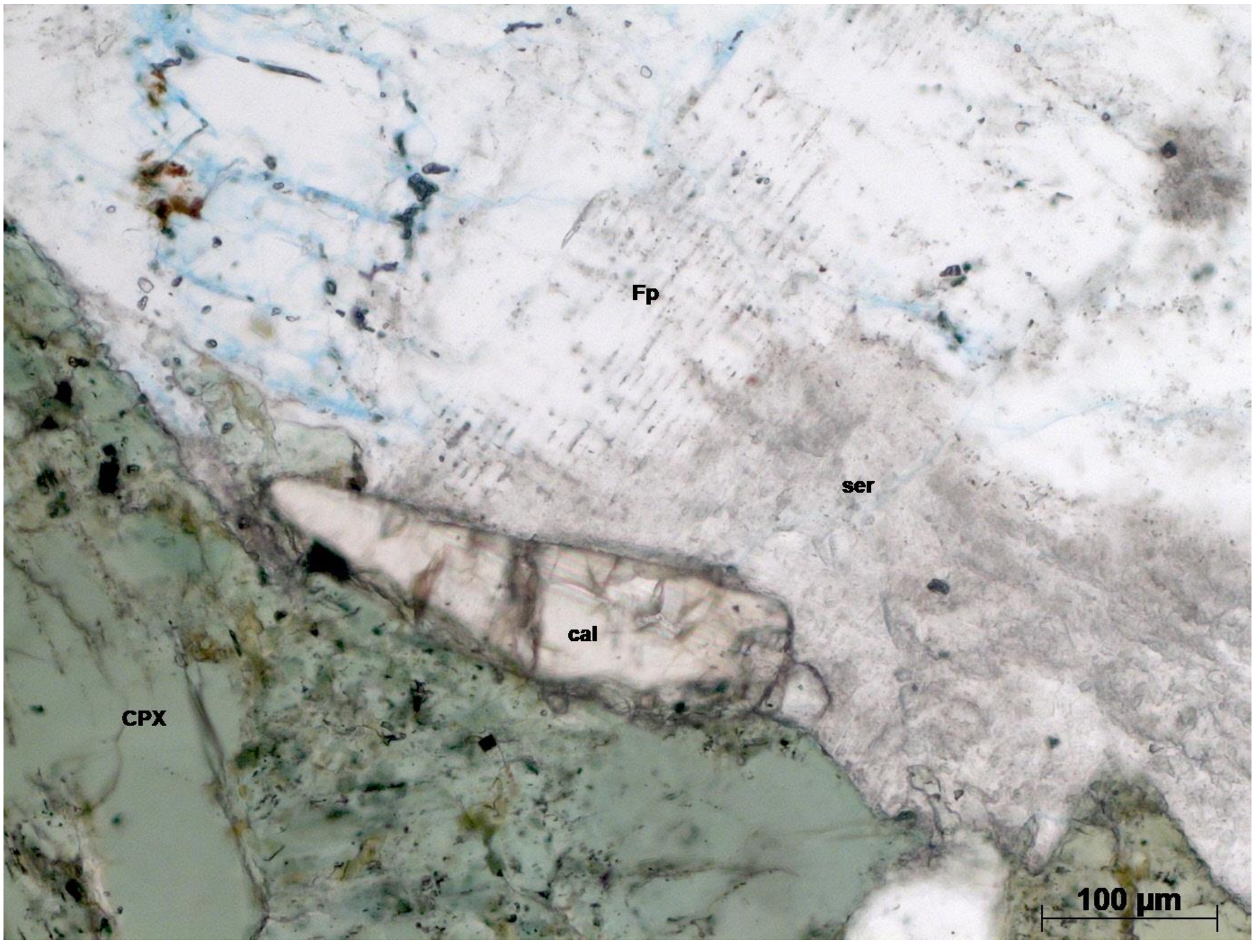
LT-8_16_41-16_5_10x_ppl_055	Olivine Gabbro

Thin Section Image 55. Greater magnification view of the olivine gabbro reveals a light tan, pleochroic, biotite/phlogopite phenocryst at center that exhibits one good cleavage plane. At left and at right are dark green and colorless, high-relief, augite-clinopyroxene. Opaque magnetite is common among the rock. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



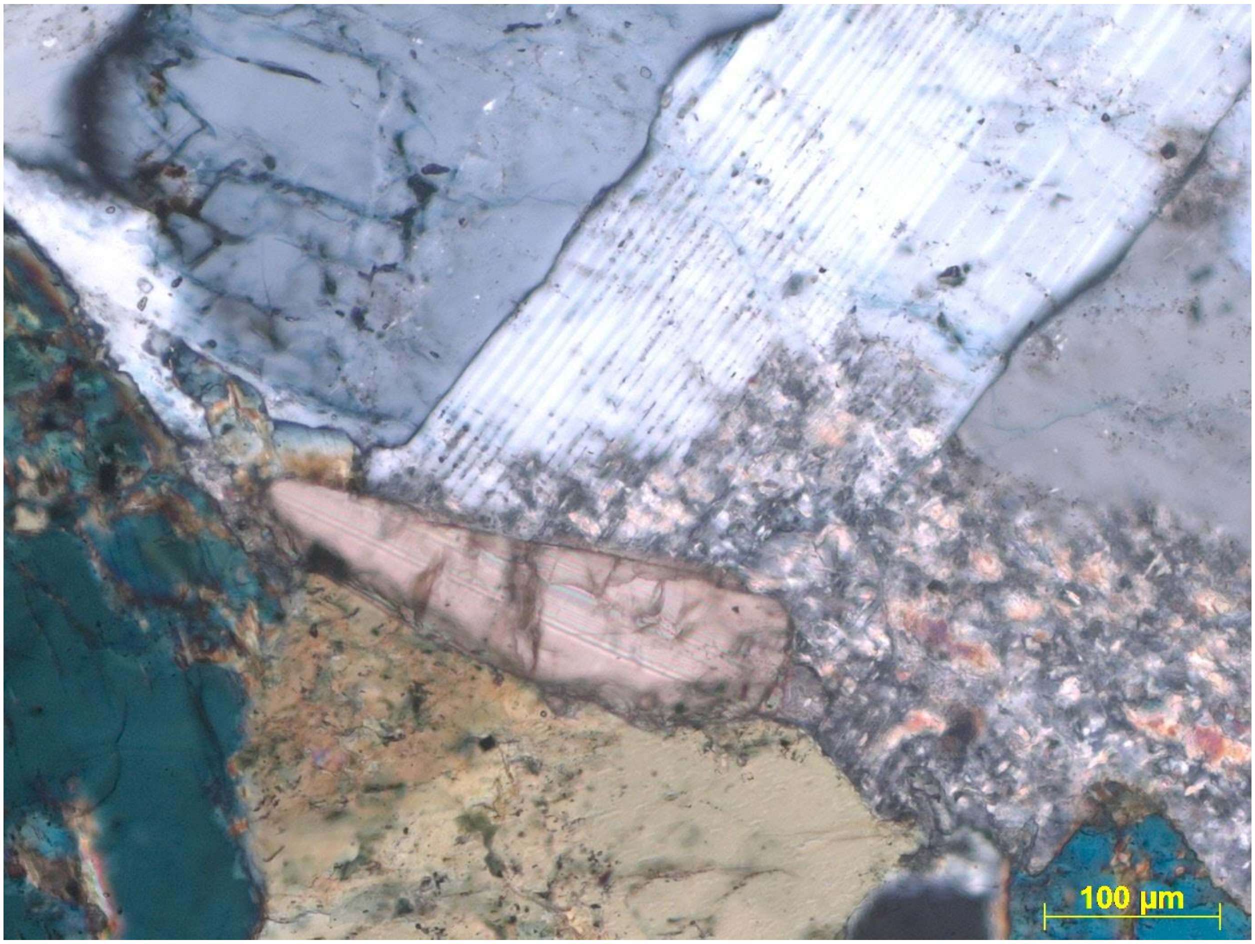
LT-8_16_41-16_5_10x_xpl_056	Olivine Gabbro

Thin Section Image 56. The same view as in thin section 55 but taken under crossed-polarized light to show the characteristic bird's-eye extinction of the biotite/phlogopite at center, as well as the middle-second order interference colors of the augite-clinopyroxene at right. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



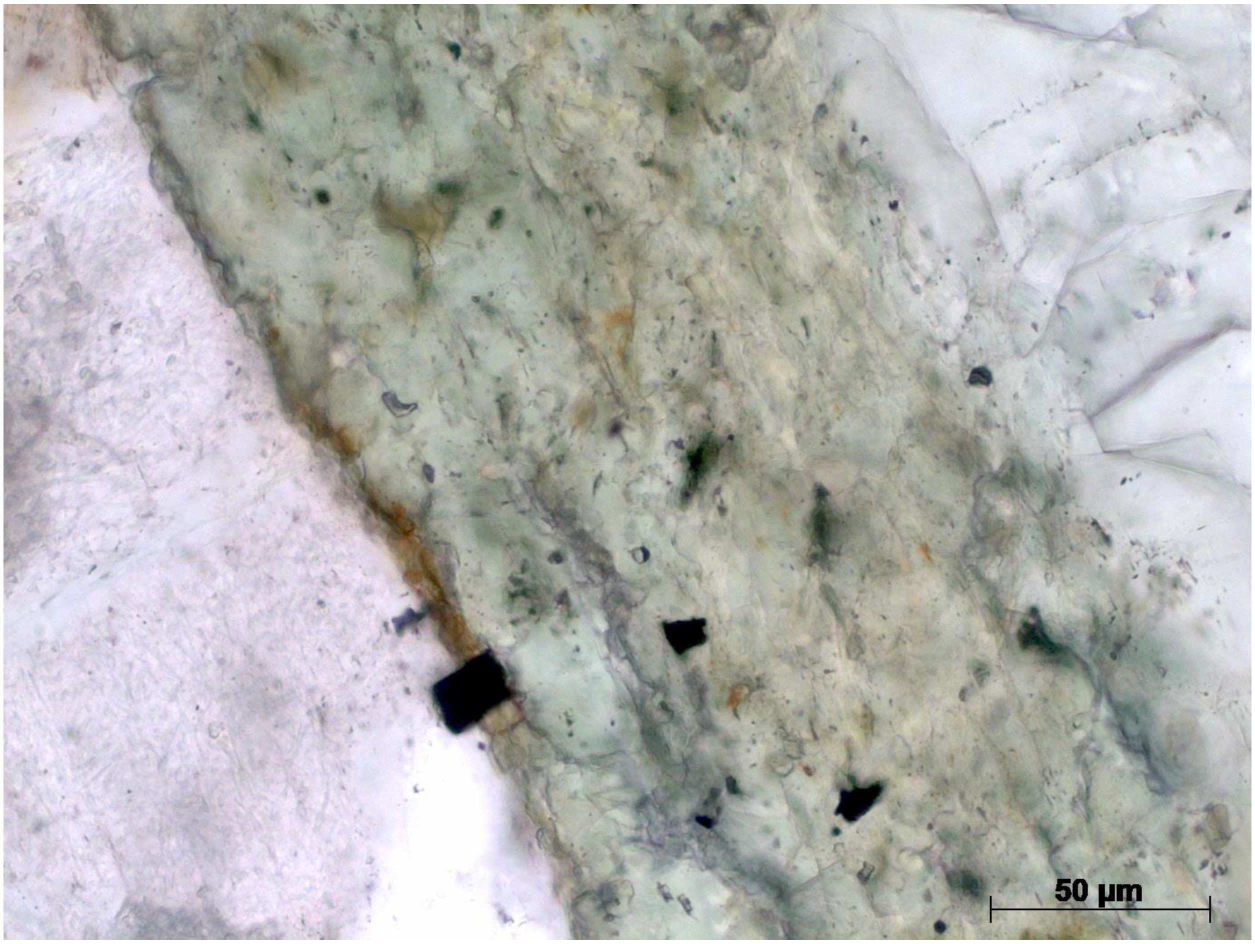
LT-8_16_41-16_5_20x_ppl_057	Olivine Gabbro

Thin Section Image 57. Closer inspection of the olivine gabbro at the edge of the large vein reveals plagiolcase feldspar (Fp), as well as patches of medium-gray sericite alteration (ser). At bottom is a high-relief calcite crystal (cal) adjacent to green augite-clinopyroxene (CPX). Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



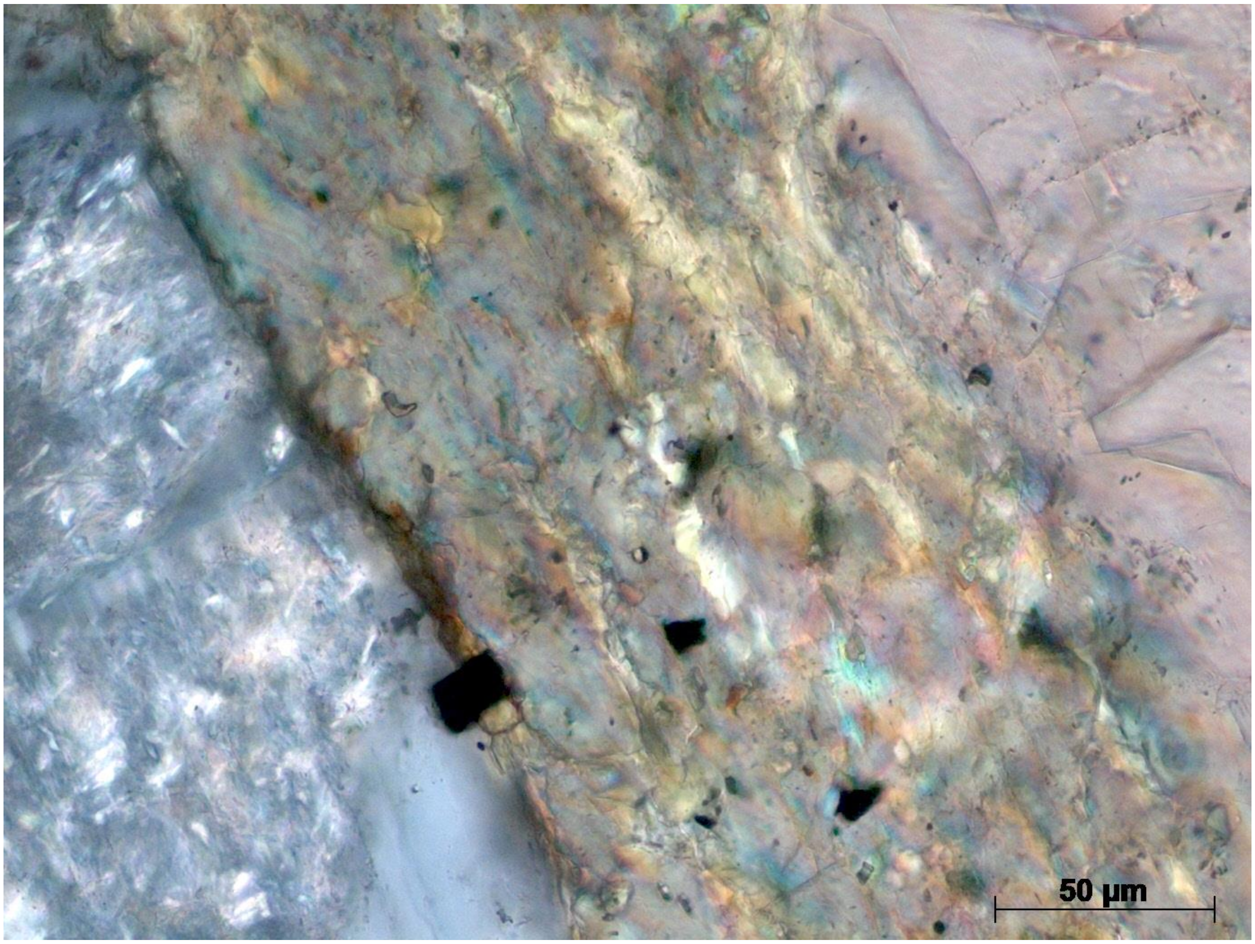
LT-8_16_41-16_5_20x_xpl_058	Olivine Gabbro

Thin Section Image 58. The same view of thin section 57 but under crossed-polarized light illustrates the polysynthetic twinning of the plagioclase feldspar, as well as the bright interference colors of the sericite. The high-relief calcite reveals high, third-order interference colors and the high-relief augite shows deep green second-order interference colors. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



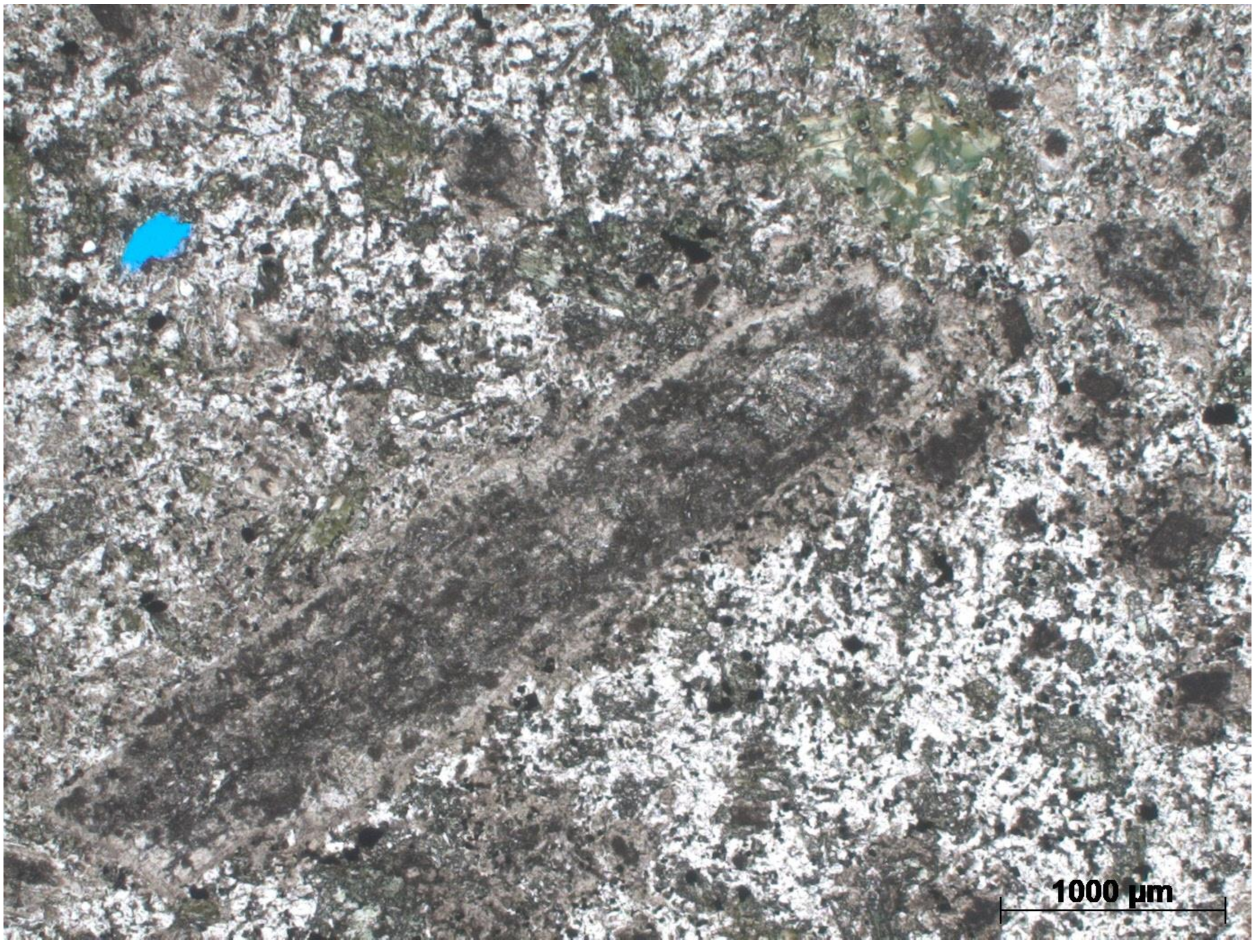
LT-8_16_41-16_5_50x_ppl_059	Olivine Gabbro

Thin Section Image 59. Greater magnification view of the olivine gabbro emphasizes an alteration rim of green augite-clinopyroxene that is partially altered to uralite. At left is the contact with the plagiolcase-filled vein and much of the feldspar is altered to sericite (gray). Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



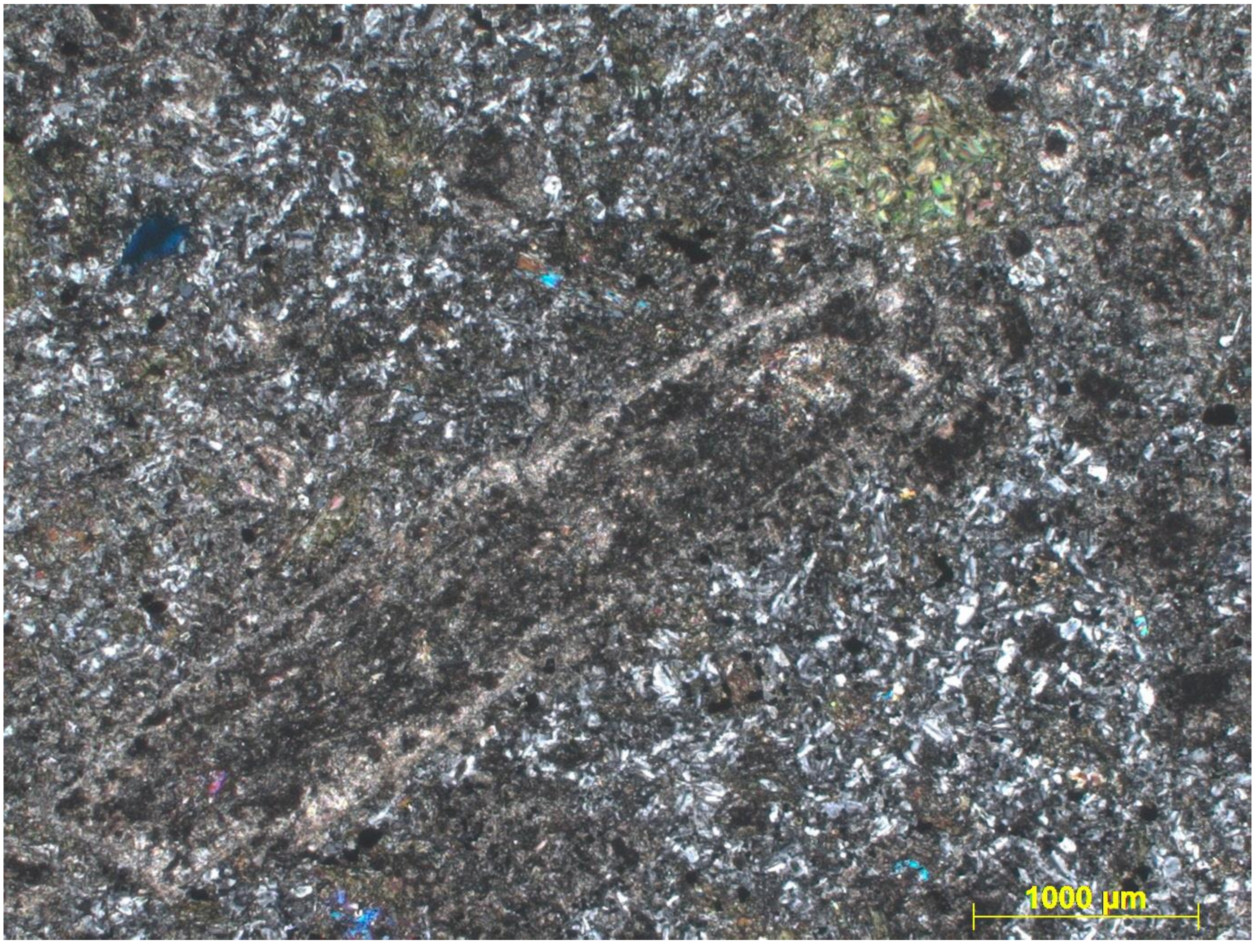
LT-8_16_41-16_5_50x_xpl_060	Olivine Gabbro

Thin Section Image 60. The same image as thin section image 59 but under crossed-polarized light reveals bright, high-order interference colors of sericite at left, as well bright yellow, green, pink, and violet of the augite-clinopyroxene. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



LT-8_55_85-55_94_2_5x_ppl_061	Dolerite or Diabase

Thin Section Image 61. Low magnification view of a dolerite/diabase reveals abundant white, finely-crystalline laths of plagioclase feldspar that host fine-to-coarsely-crystalline augite-clinopyroxene that is mostly altered to uralite (gray) and serpentine (green). Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.

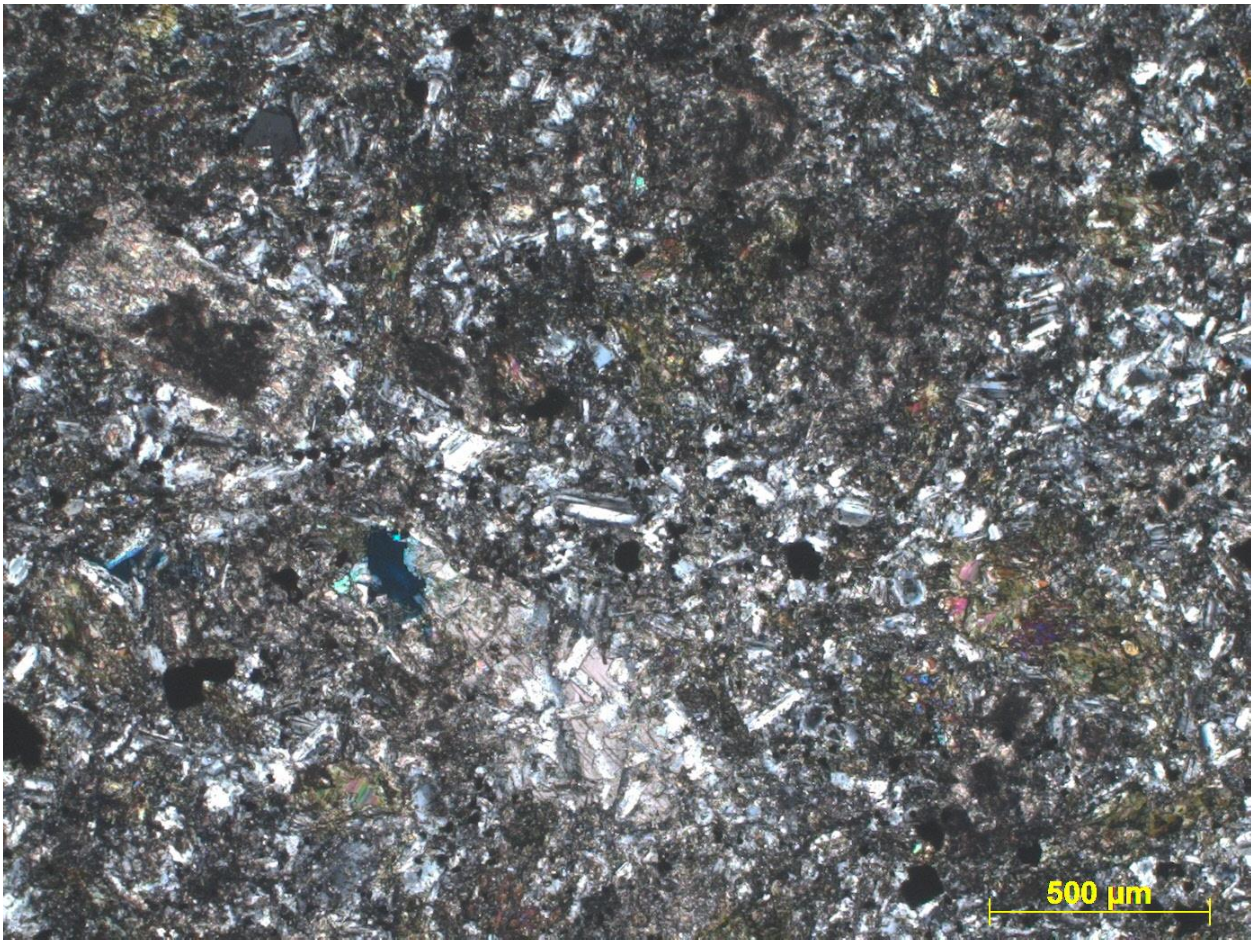


LT-8_55_85-55_94_2_5x_xpl_062	Dolerite or Diabase

Thin Section Image 62. The same photo as in thin section image 61 but taken under crossed-polarized light reveals simple and polysynthetic twinning among the finely-crystalline plagiolcase feldspar, as well as small intact portions of augite-clinopyroxene with blue or violet second-order interference colors. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.

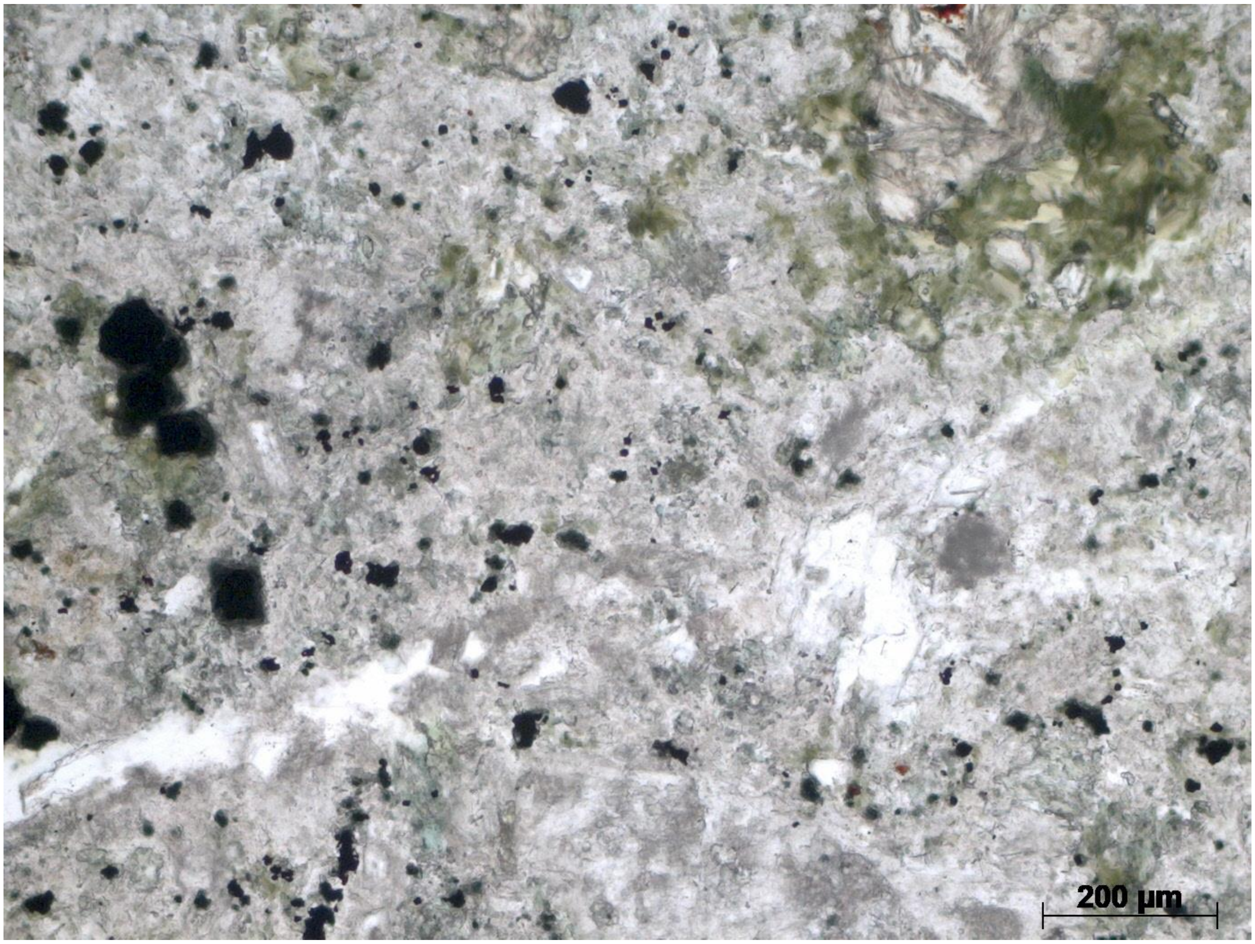
LT-8_55_85-55_94_5x_ppl_06	Dolerite or Diabase

Thin Section Image 63. Increased magnification view of a dolerite/diabase exhibits abundant, finely-crystalline plagiolcase feldspar and clinopyroxene that are partially altered to sericite (gray). Minor augite-clinopyroxene is mostly replaced with uralite and serpentine (green). However, some of the dark green phenocrysts are hornblende or biotite. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



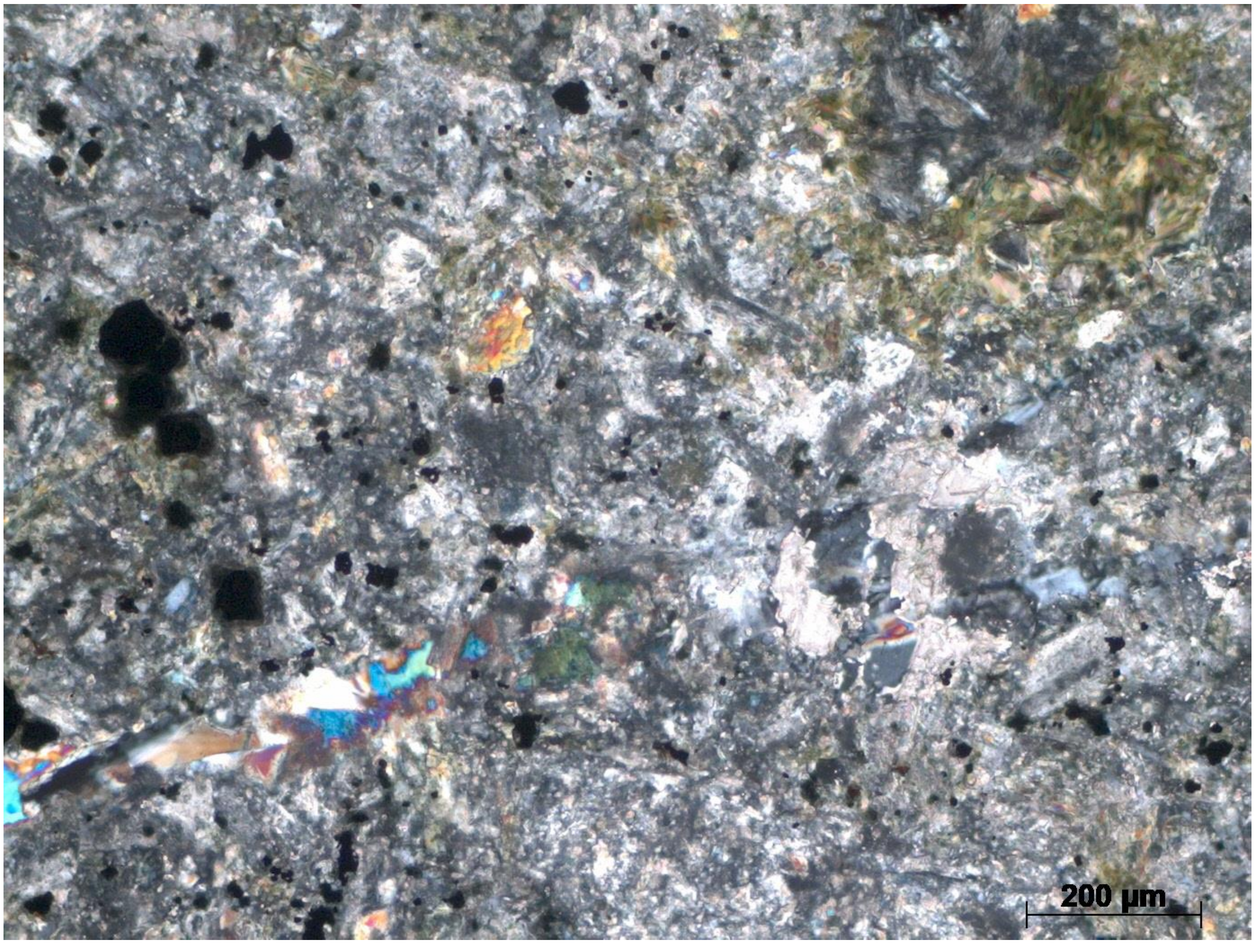
LT-8_55_85-55_94_5x_xpl_064	Dolerite or Diabase

Thin Section Image 64. The same image as thin section image 63 but taken under crossed-polarized light illustrates simple and polysynthetic twinning of plagiolcase feldspar, as well a second-order interfere colors of augite-clinopyroxene that is altered to green serpentine. At lower-center is bright calcite that encloses feldspar crystals in a poikilitic texture. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



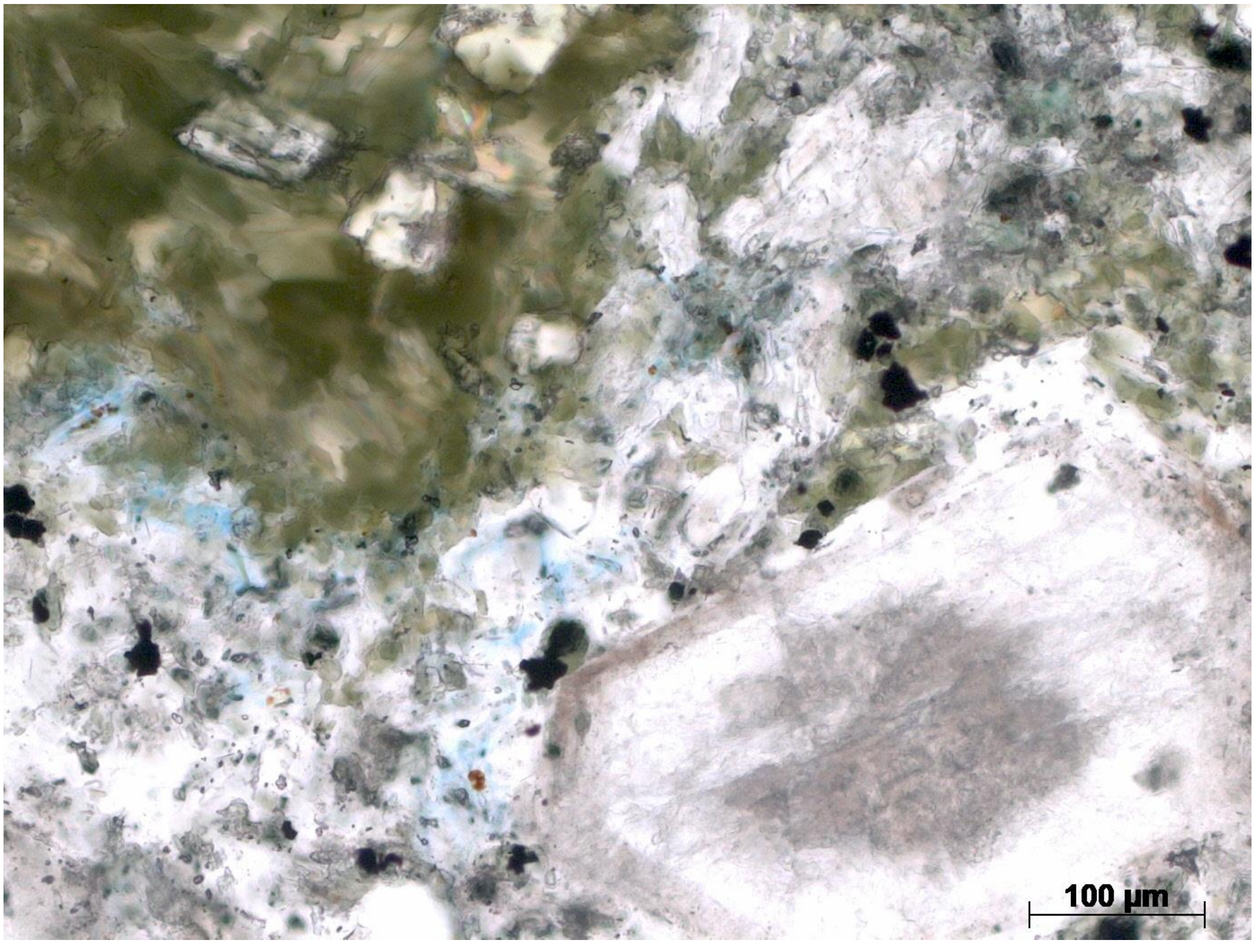
LT-8_55_85-55_94_10x_ppl_065	Dolerite or Diabase

Thin Section Image 65. More magnified view of the dolerite/diabase reveals abundant small crystals of opaque magnetite, plagioclase feldspar (white) that is extensively altered to sericite (gray), and clinopyroxene altered to serpentine (pale-green). Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



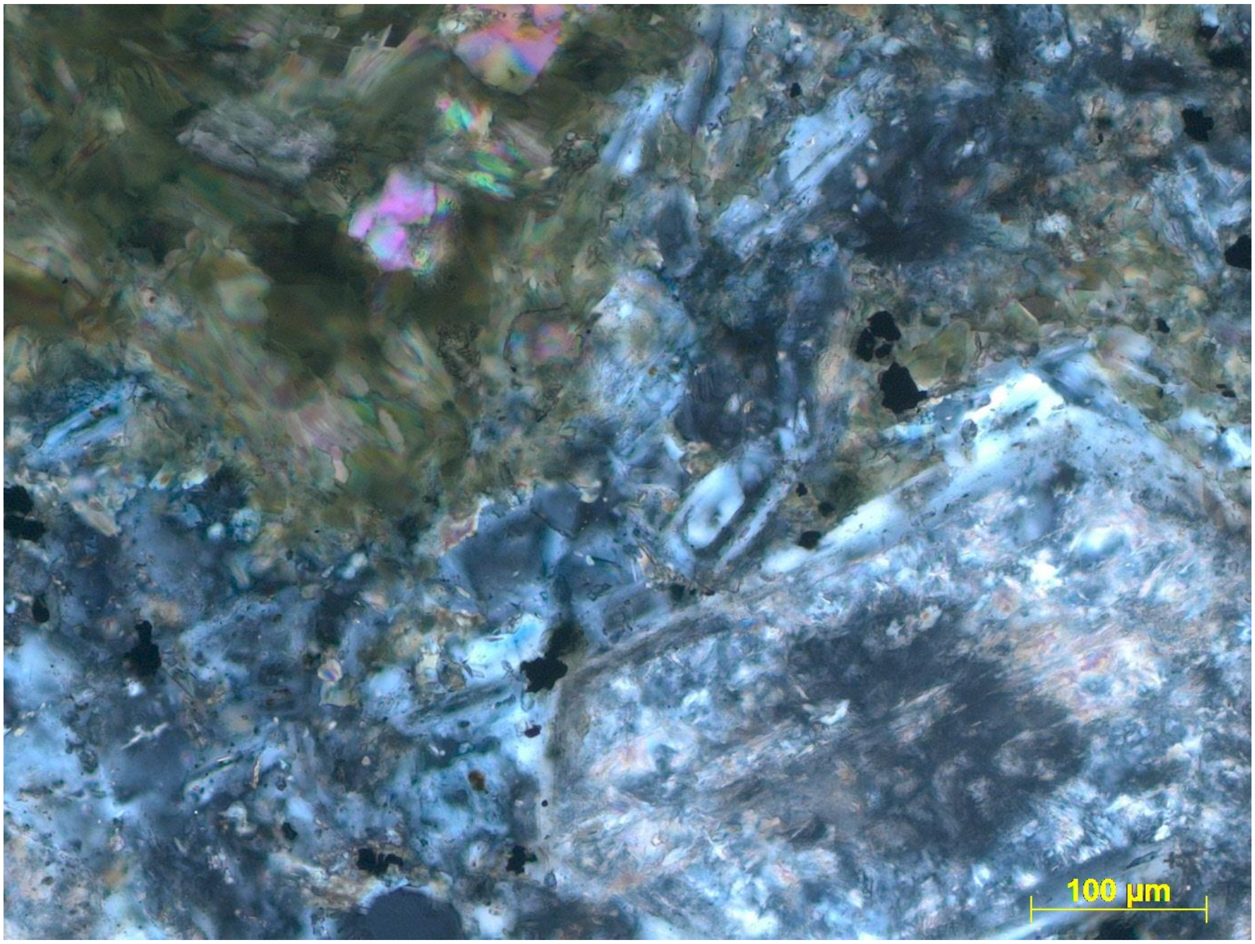
574_TEL-JL-BH12-S5_5x_xpl_066	Dolerite or Diabase

Thin Section Image 66. The same view as in thin section 65 but taken under crossed-polarized light to show the bright second-order interference colors of the remnant clinopyroxene (yellow, blue, and violet), as well as the dark, first order interference of the abundant serpentine replacement admixed with calcite and hornblende. Bright calcite is particularly abundant in this image and widely disseminated among the gray feldspar groundmass. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



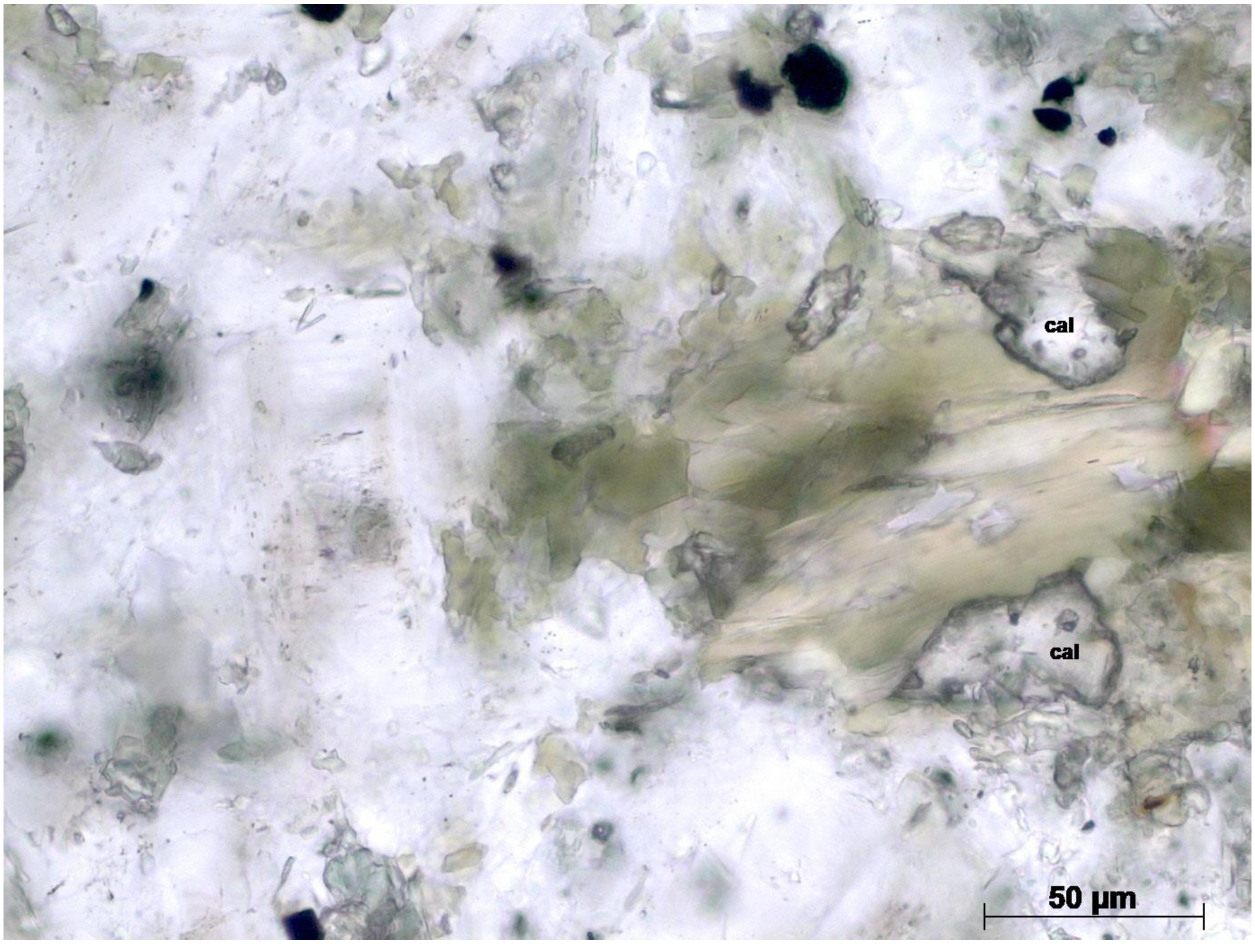
LT-8_55_85-55_94_20x_ppl_067	Dolerite or Diabase

Thin Section Image 67. Closer inspection of the dolerite/diabase shows a zoned plagiolcase feldspar (white) that is mostly replaced with sericite. At upper left is remnant clinopyroxene that is replaced with serpentine (green) and chlorite. Small, subhedral crystals of opaque magnetite are widely scattered in the groundmass. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



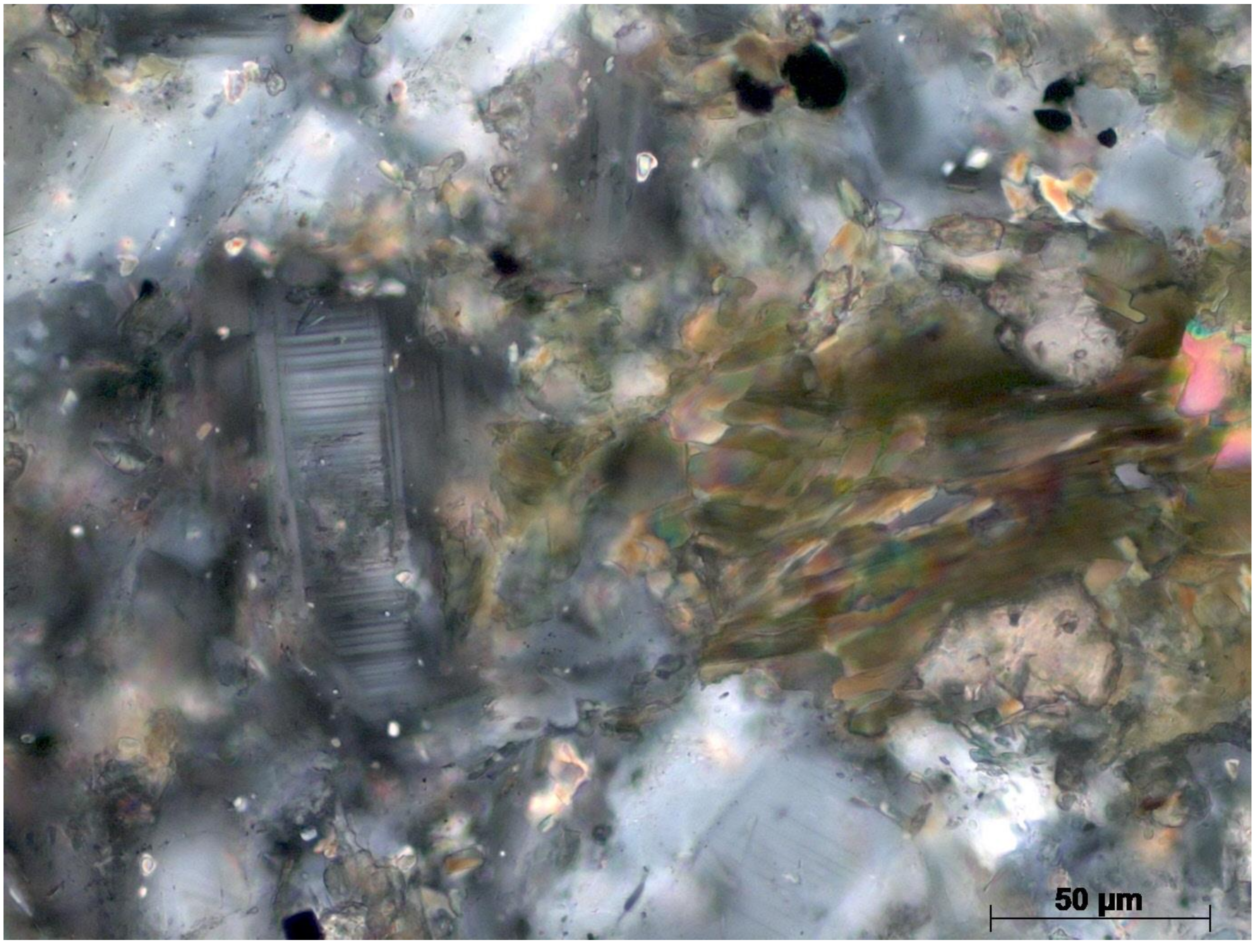
LT-8_55_85-55_94_20x_xpl_068	Dolerite or Diabase

Thin Section Image 68. The same view of thin section 67 but under crossed-polarized light illustrates the bright violet and green interference colors of clinopyroxene in fractured and altered to green serpentine at upper left. Bright sericite is prominent within the zoned plagioclase phenocryst at lower-right. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



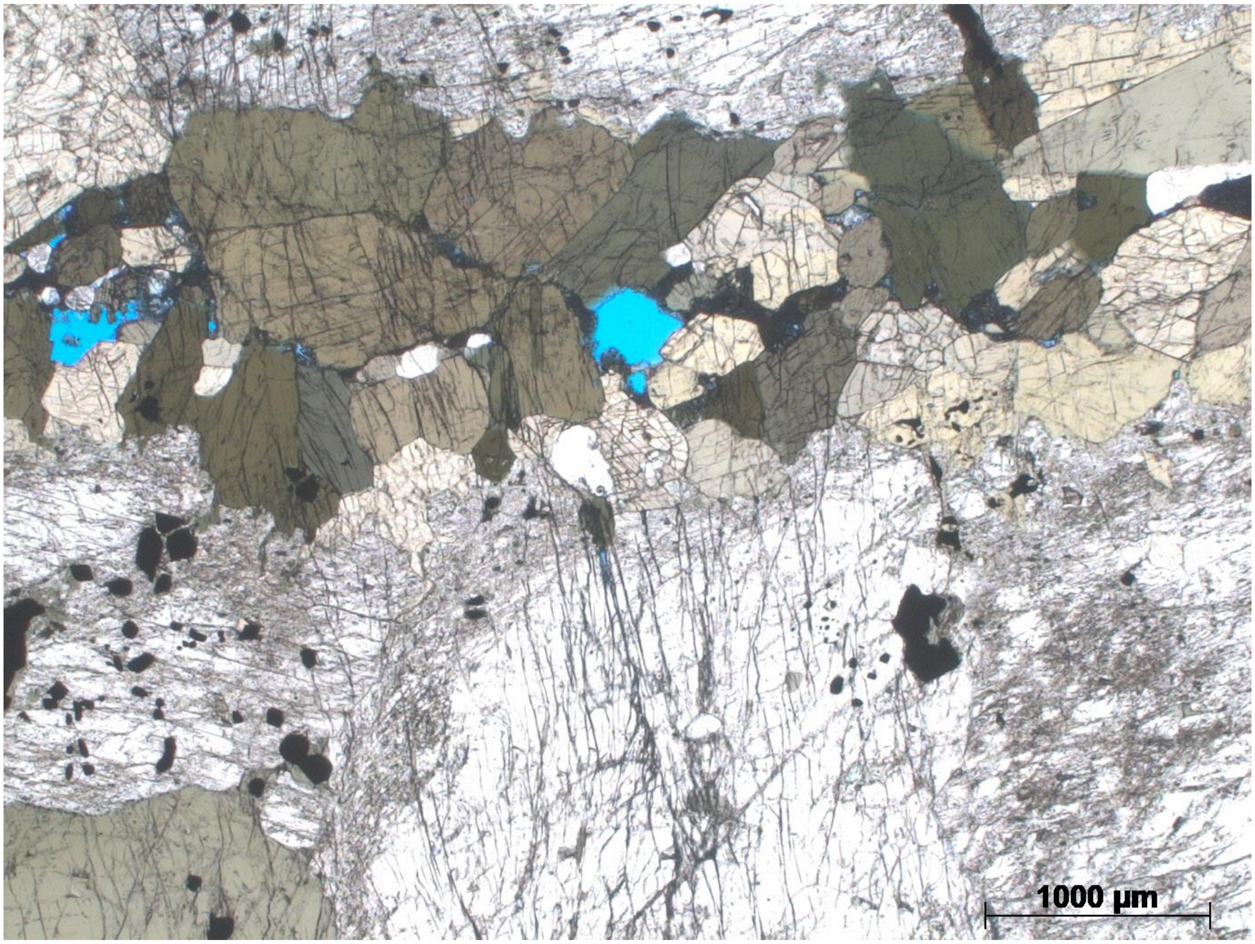
LT-8_55_85-55_94_50x_ppl_069	Dolerite or Diabase

Thin Section Image 69. Highest magnification detail of the dolerite shows green serpentine replacement of a remnant clinopyroxene at right, as well as the low-relief calcic plagiolcase groundmass at left (white). High-relief calcite crystals (cal) are also prominent replacement minerals of the remnant augite-clinopyroxene. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



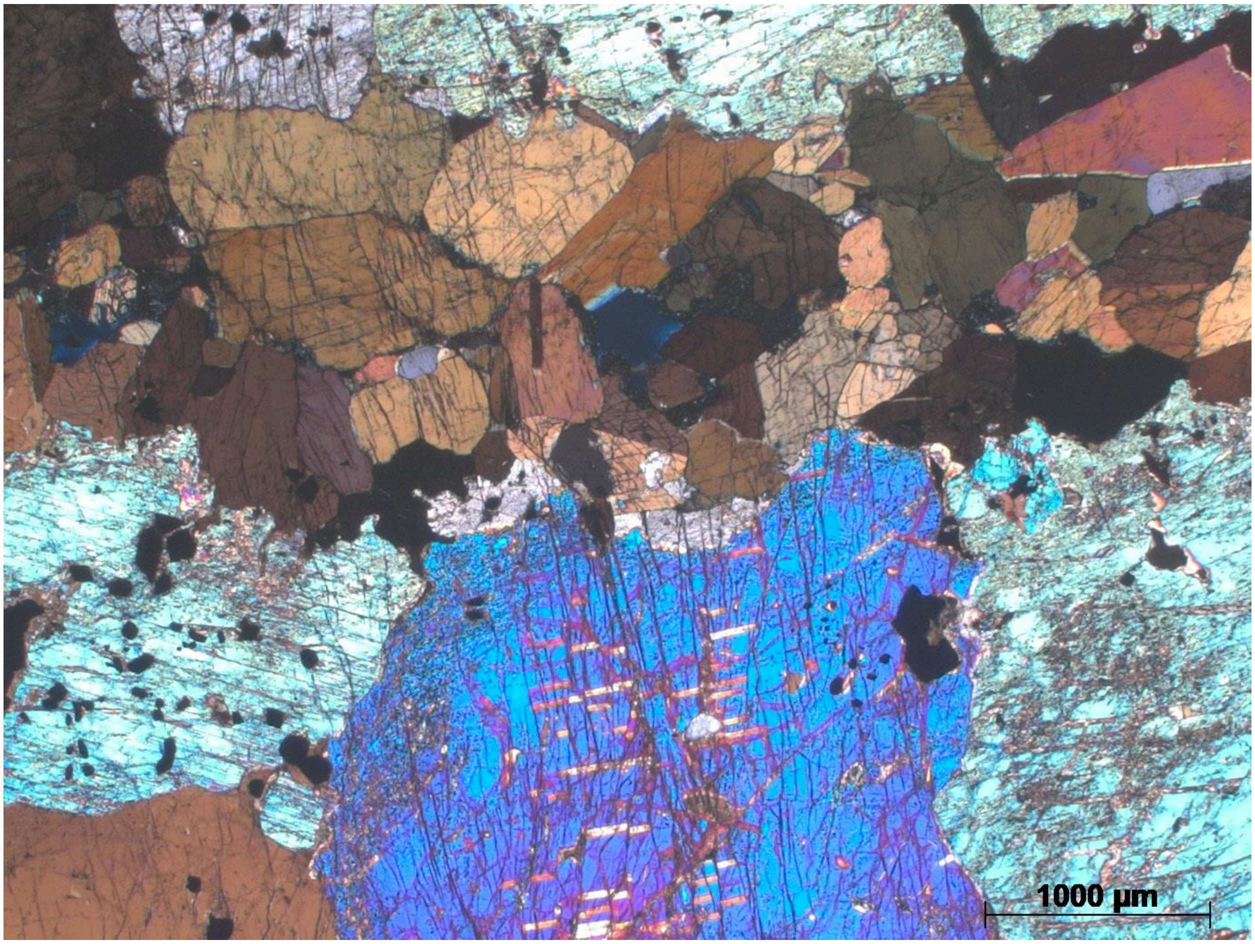
LT-8_55_85-55_94_50x_xpl_070	Dolerite or Diabase

Thin Section Image 70. The same image as thin section image 69 but under crossed-polarized light reveals bright, upper second-order yellow and pink interference colors of remnant clinopyroxene at right, as well as a darker green of the serpentine. The plagiolcase feldspar in the groundmass exhibits low-first order gray and white interference colors and polysynthetic twinning. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



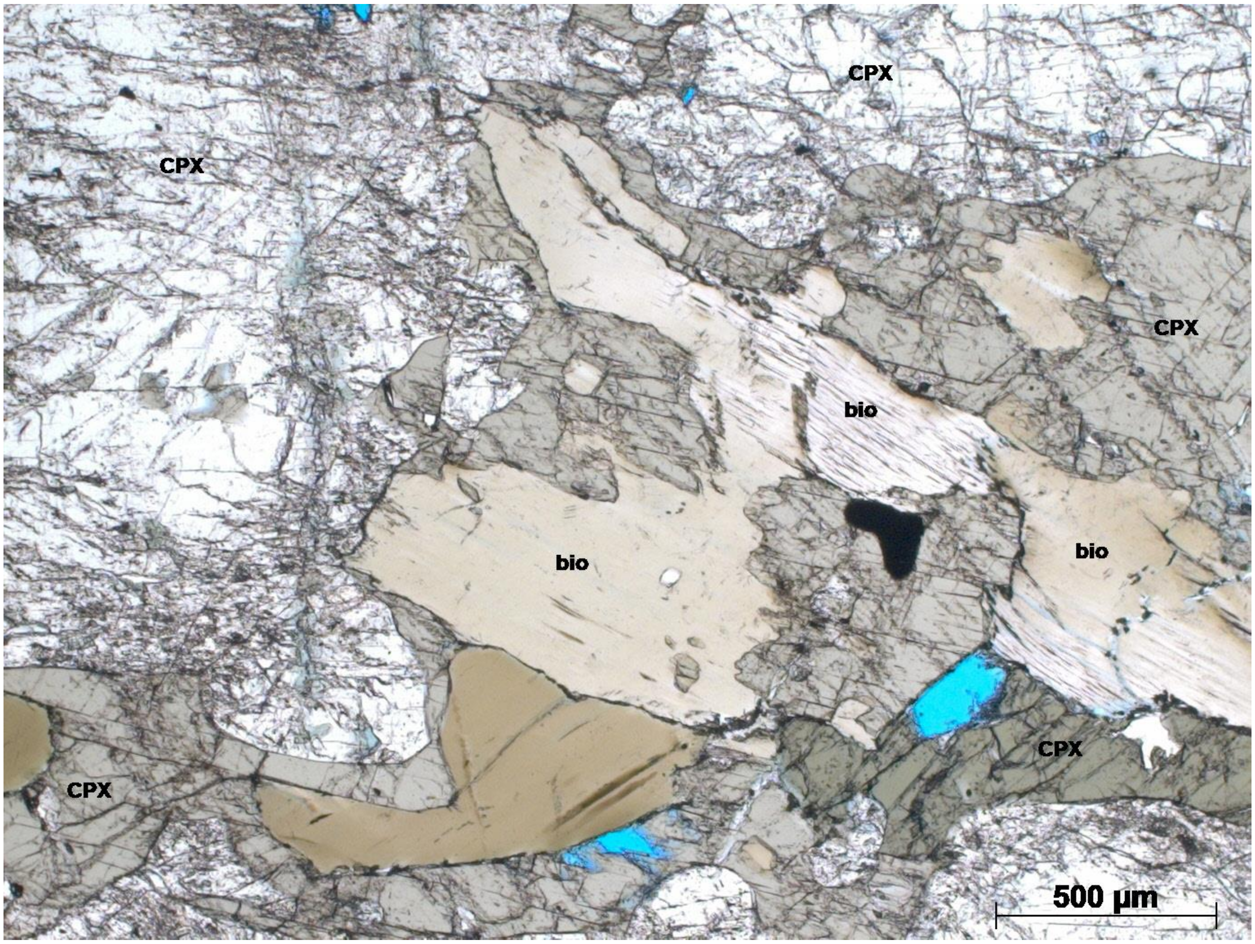
LT-9_93_48-93_56_2_5x_ppl_071	Clinopyroxenite

Thin Section Image 71. Low magnification view of a clinopyroxenite shows coarsely crystalline augite clinopyroxene (colorless) and green, pleochroic hornblende along a vein. Subhedral, opaque magnetite are widely scattered throughout the rock. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



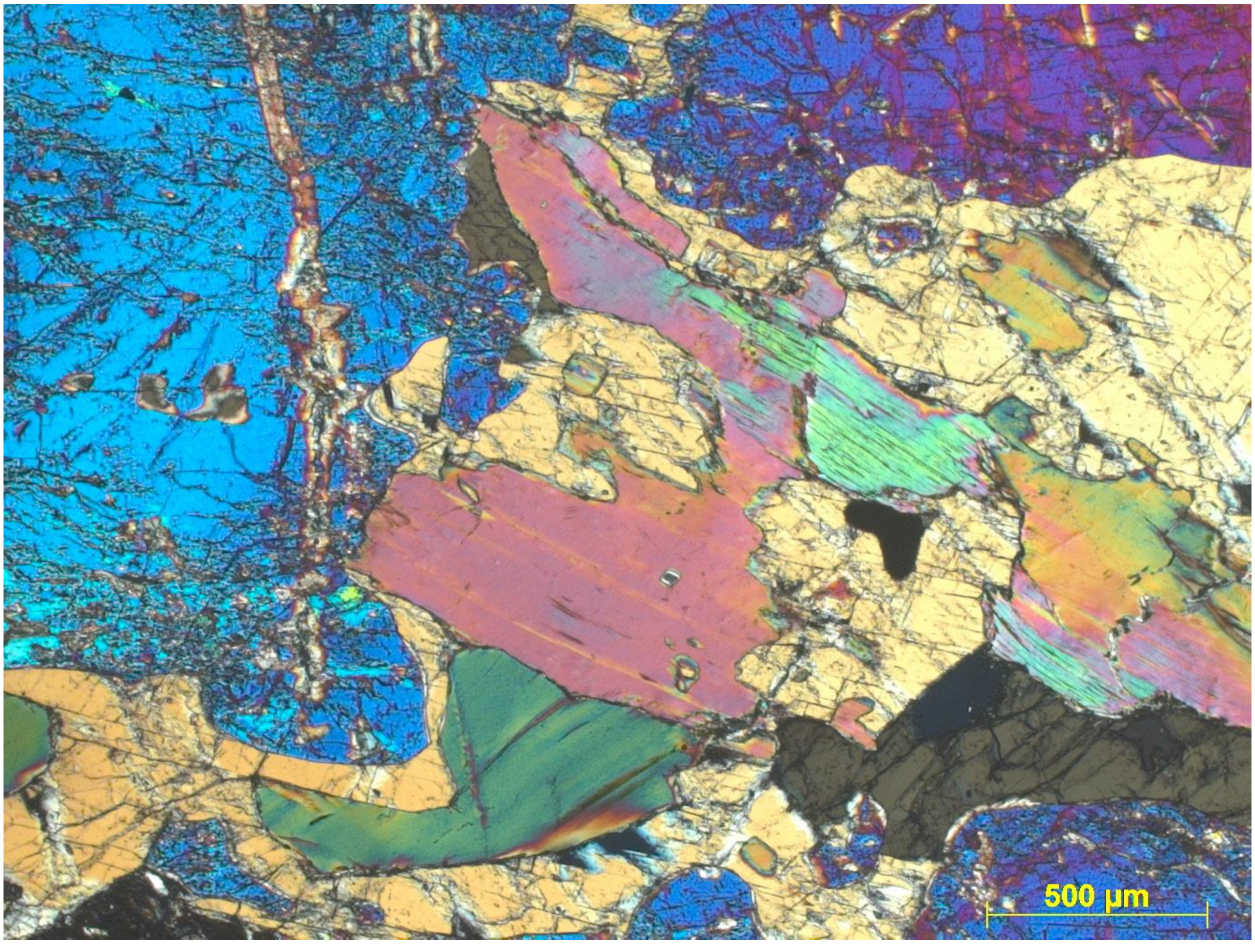
LT-9_93_48-93_56_2_5x_xpl_072	Clinopyroxenite

Thin Section Image 72. The same photo as in thin section image 71 but taken under crossed-polarized light reveals vibrant middle, second-order interference colors of the augite clinopyroxene showing bright purple, blue, and green. The darker, hornblende shows characteristic amphibole cleavage and middle, second order interference colors that appear masked from the deep color of the mineral. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



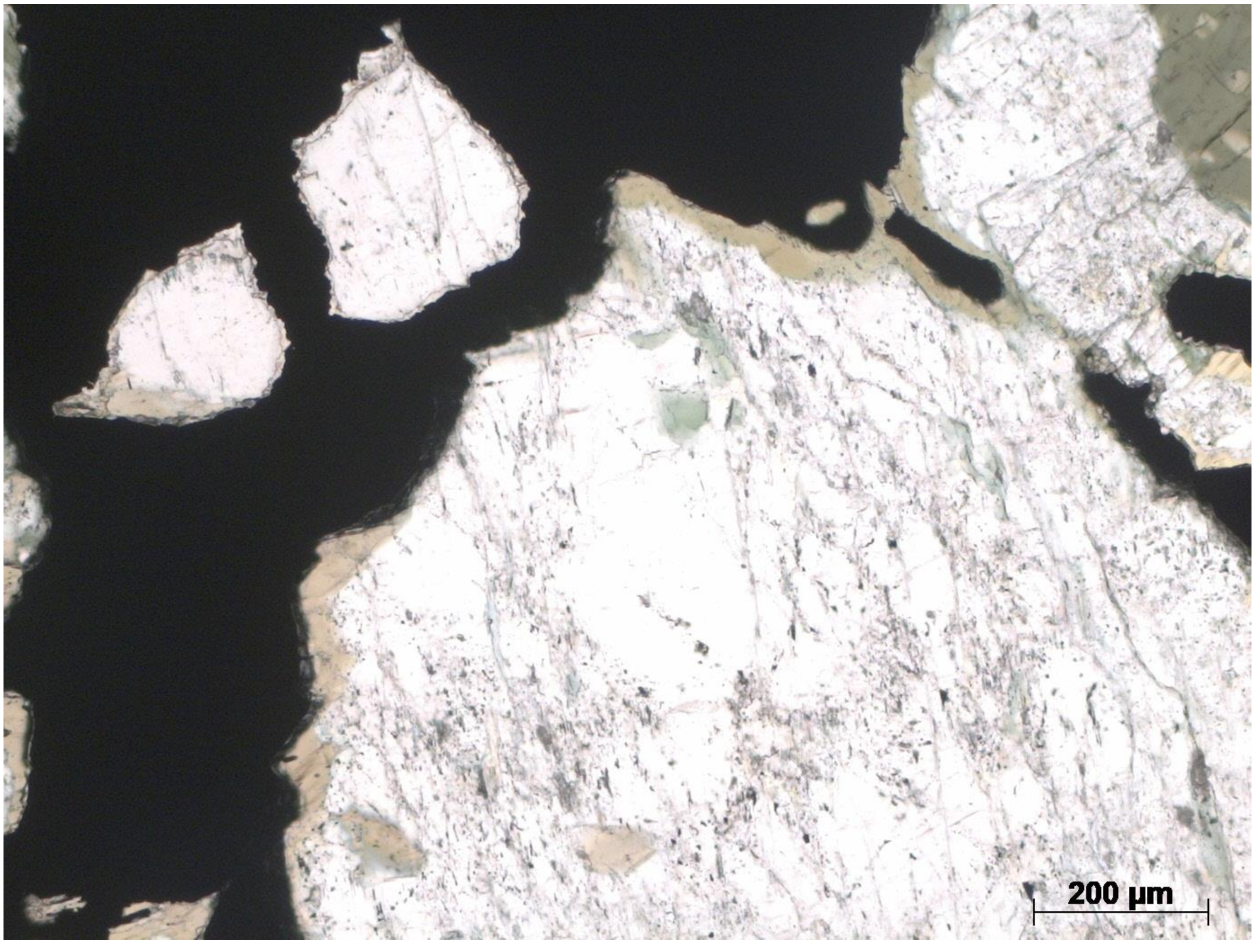
LT-9_93_48-93_56_5x_ppl_073	Clinopyroxenite

Thin Section Image 73. Closer inspection of the clinopyroxenite (CPX) reveals colorless and pale-green augite-clinopyroxene that is enclosing a combination of biotite/phlogopite (bio, low-relief). Note the biotite/phlogopite exhibits one good cleavage, whereas the augite has two good cleavages at 87 and 93 degrees. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



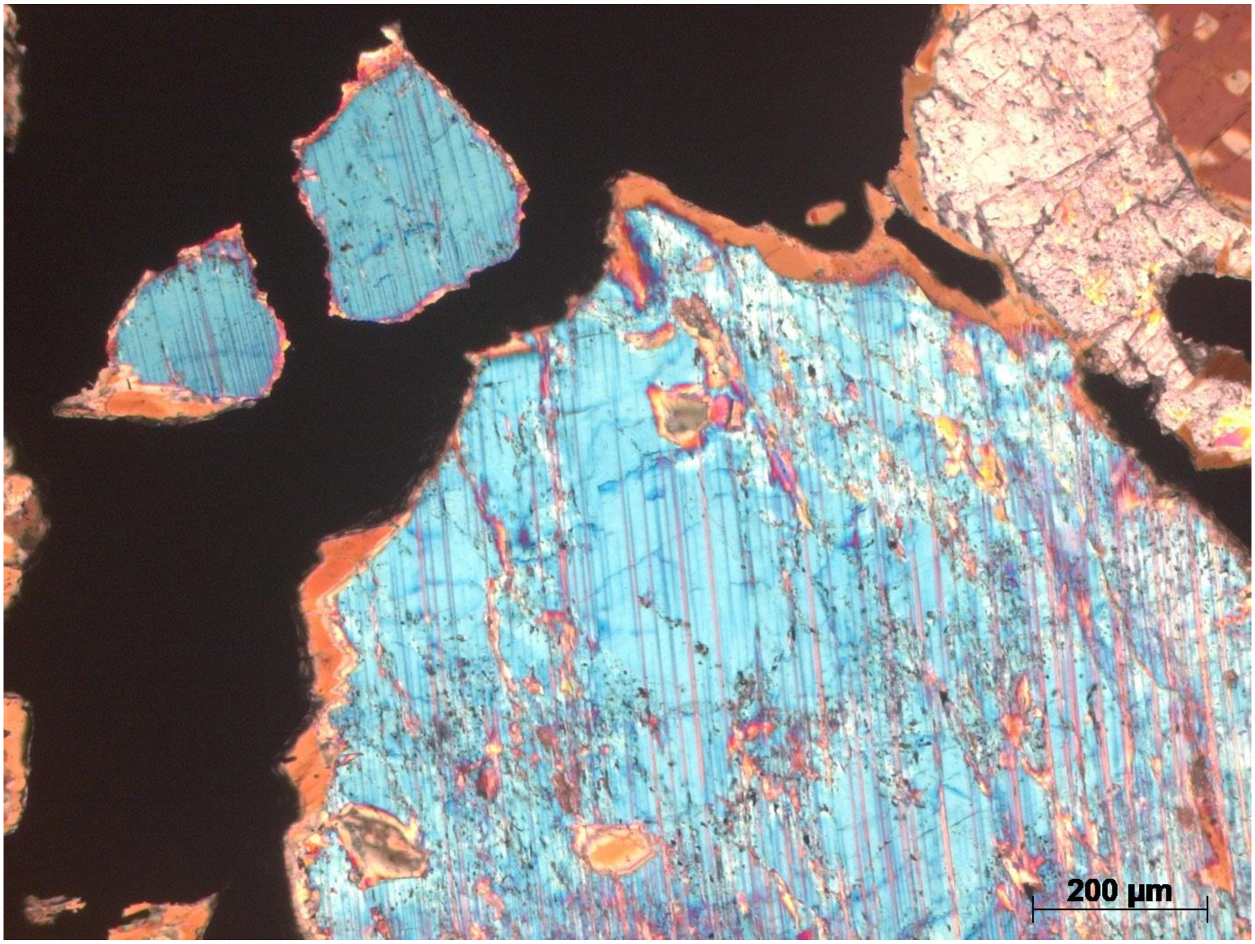
LT-9_93_48-93_56_5x_xpl_074	Clinopyroxenite

Thin Section Image 74. The same image as thin section image 73 but taken under crossed-polarized light illustrates vibrant second order interference colors of the augite-clinopyroxene from bright blue and violet to yellow. The biotite/phlogopite also has vibrant second-order interference colors with pink and green. Cross-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



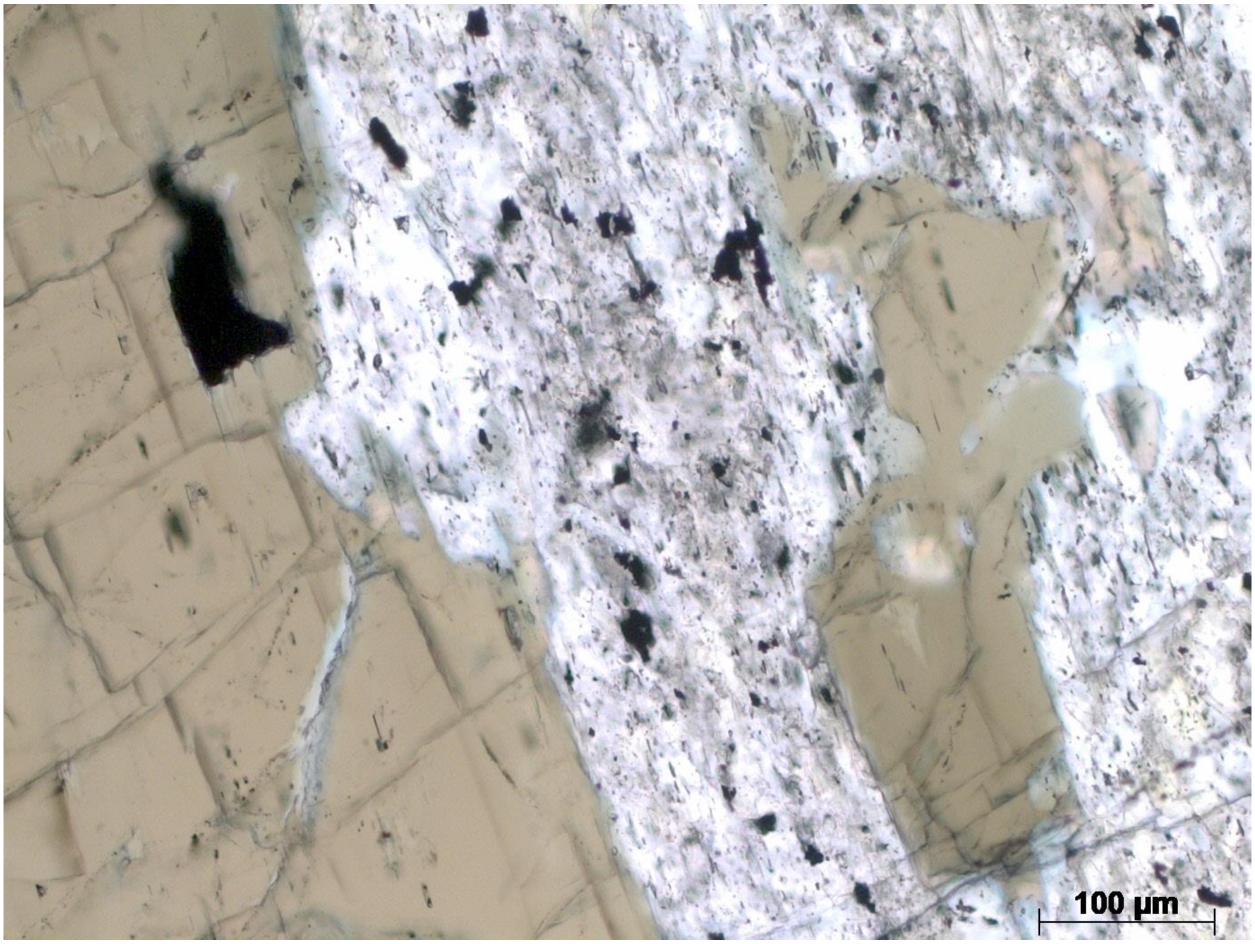
LT-9_93_48-93_56_10x_ppl_075	Clinopyroxenite

Thin Section Image 75. Increased magnification of the clinopyroxenite shows colorless to pale green augite at the edges of the opaque magnetite. The magnetite appears to envelope the augite in a poikilitic microtexture. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



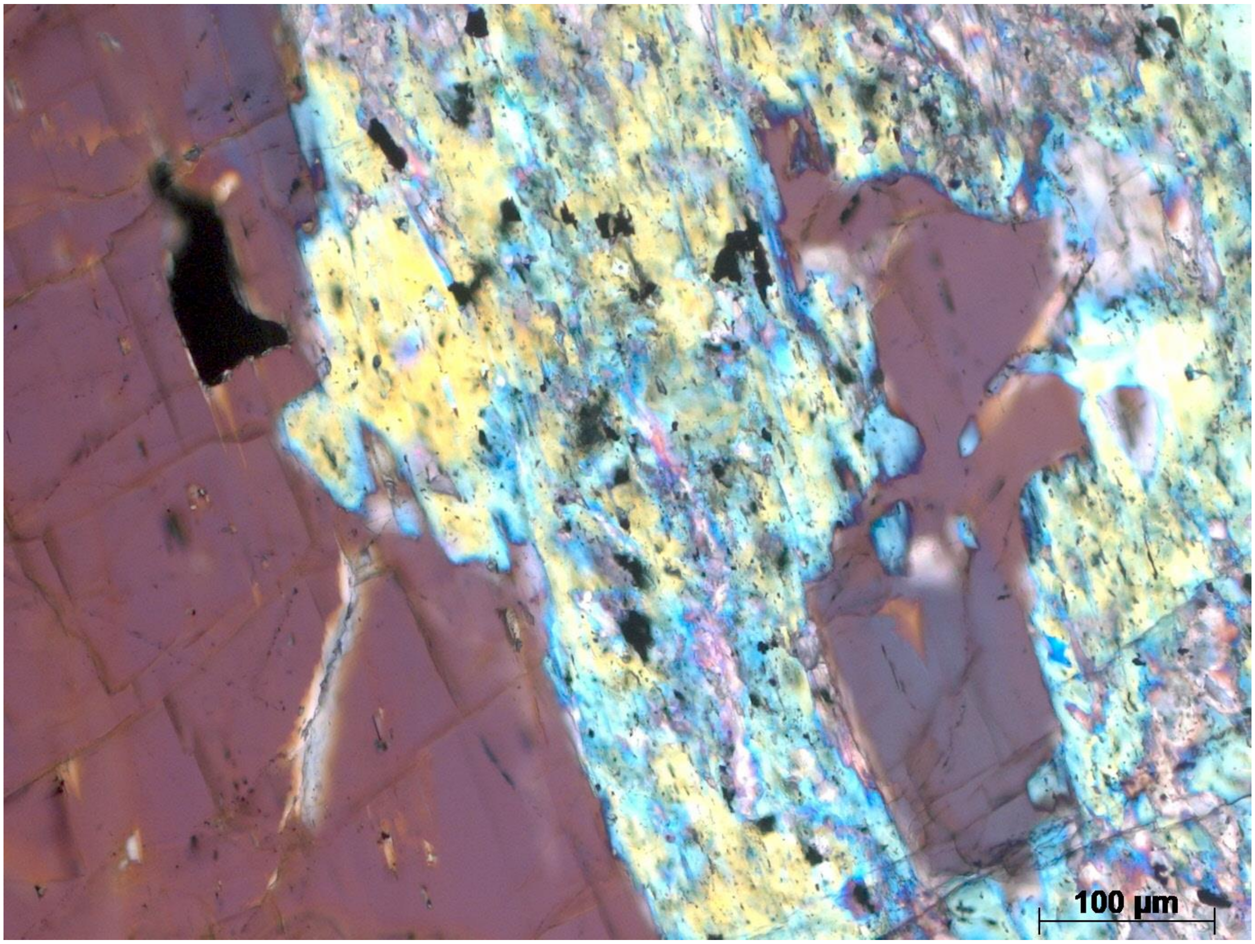
LT-9_93_48-93_56_10x_xpl_076	Clinopyroxenite

Thin Section Image 76. The same view as in thin section 75 but taken under crossed-polarized light to better illustrate envelopment of the opaque magnetite with the augite. Note the bright blue and violet second-order interference colors and simple twinning of the augite. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



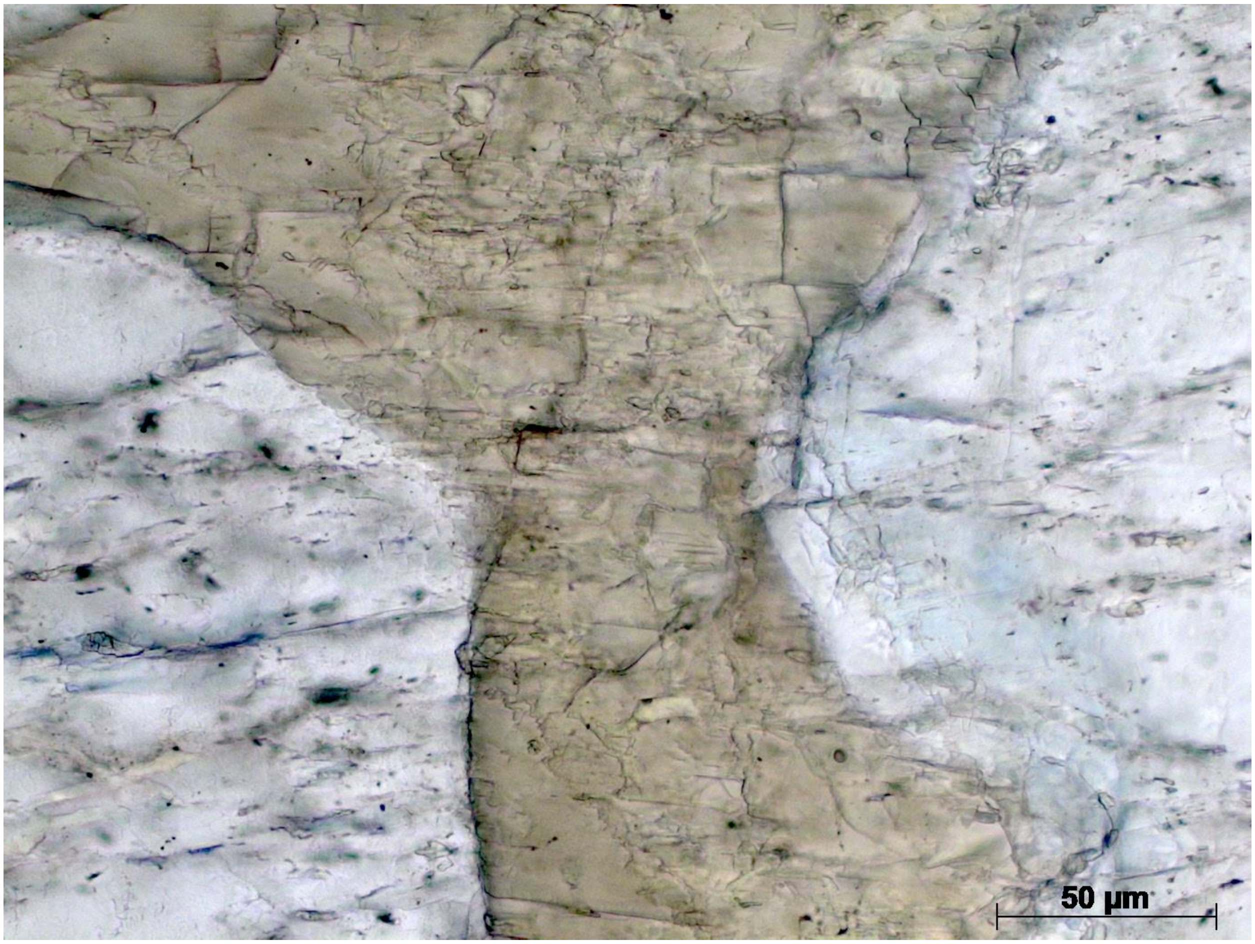
LT-9_93_48-93_56_20x_ppl_077	Clinopyroxenite

Thin Section Image 77. Closer inspection of the clinopyroxenite shows the interface between two coarsely-crystalline augite-clinopyroxene crystals, one pale green, and another colorless that hosts common alteration minerals from uralite to opaque magnetite. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



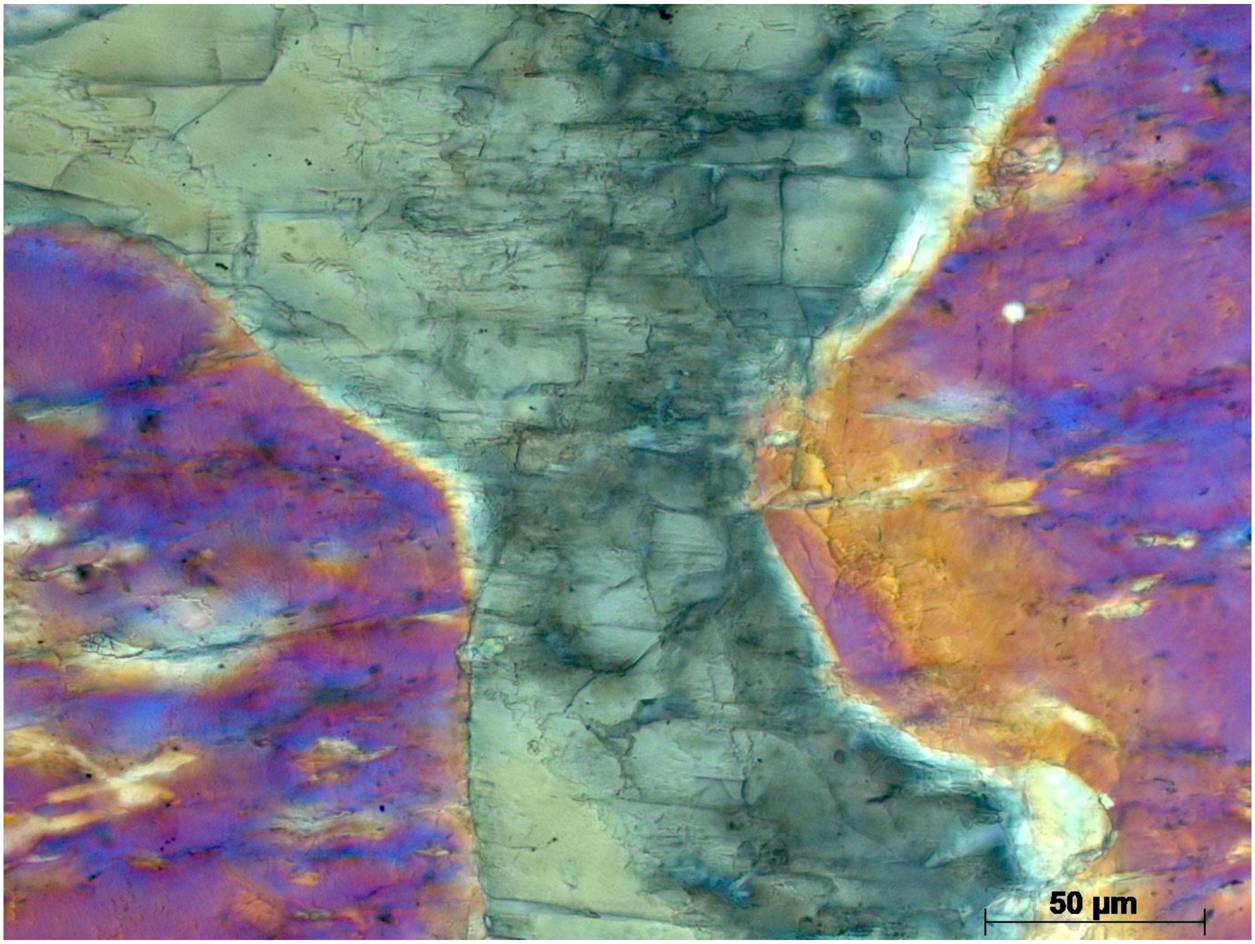
LT-9_93_48-93_56_20x_xpl_078	Clinopyroxenite

Thin Section Image 78. The same view of thin section 77 but under crossed-polarized light illustrates the bright yellow, violet, and blue interference colors of clinopyroxene crystals. The uralite is an amphibole alteration mineral and shows a mottled white to gray interference colors. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.0.2 mm.



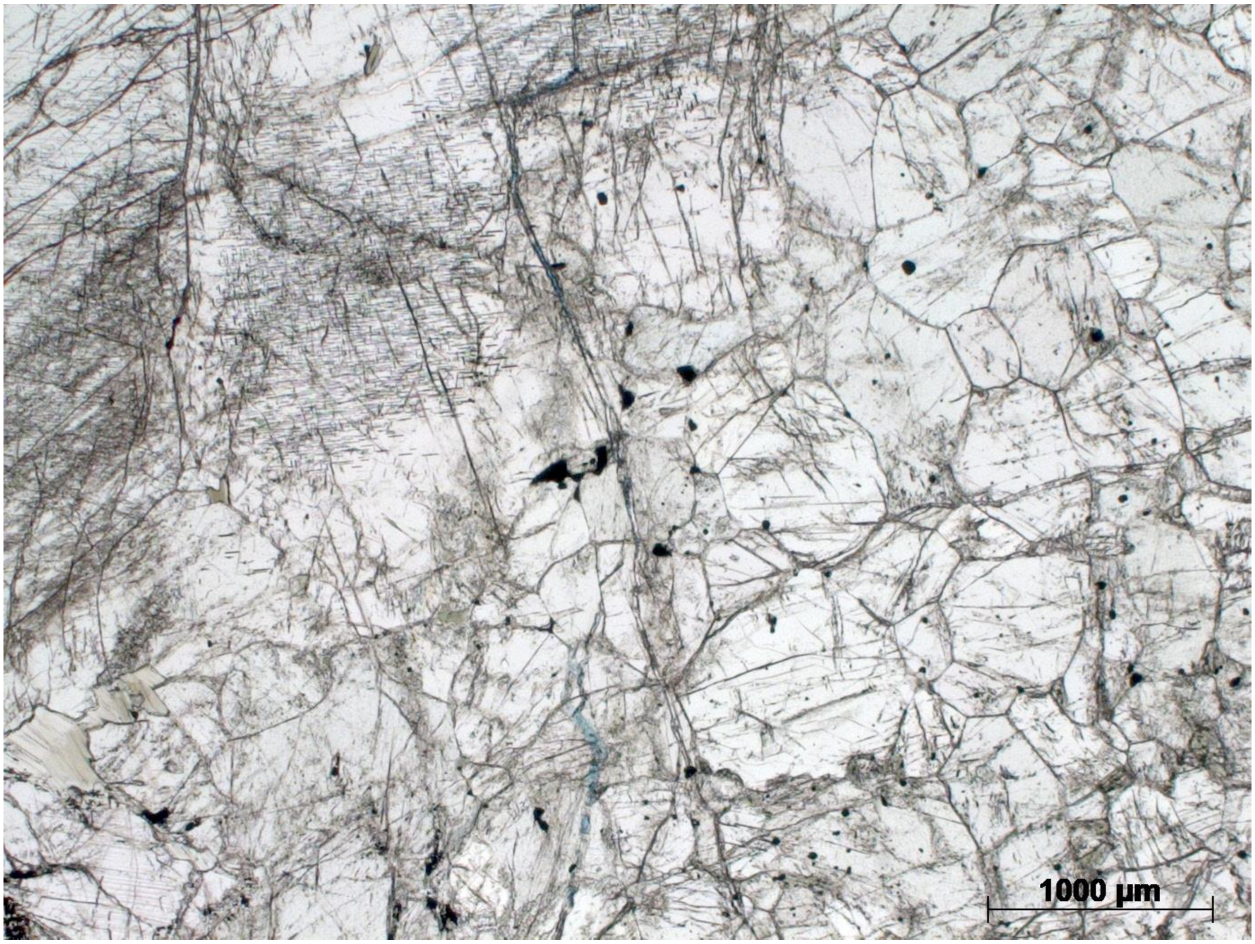
LT-9_93_48-93_56_50x_ppl_079	Clinopyroxenite

Thin Section Image 79. Highly magnified view of the clinopyroxenite reveals high-relief augite throughout the image from colorless to pale-green. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



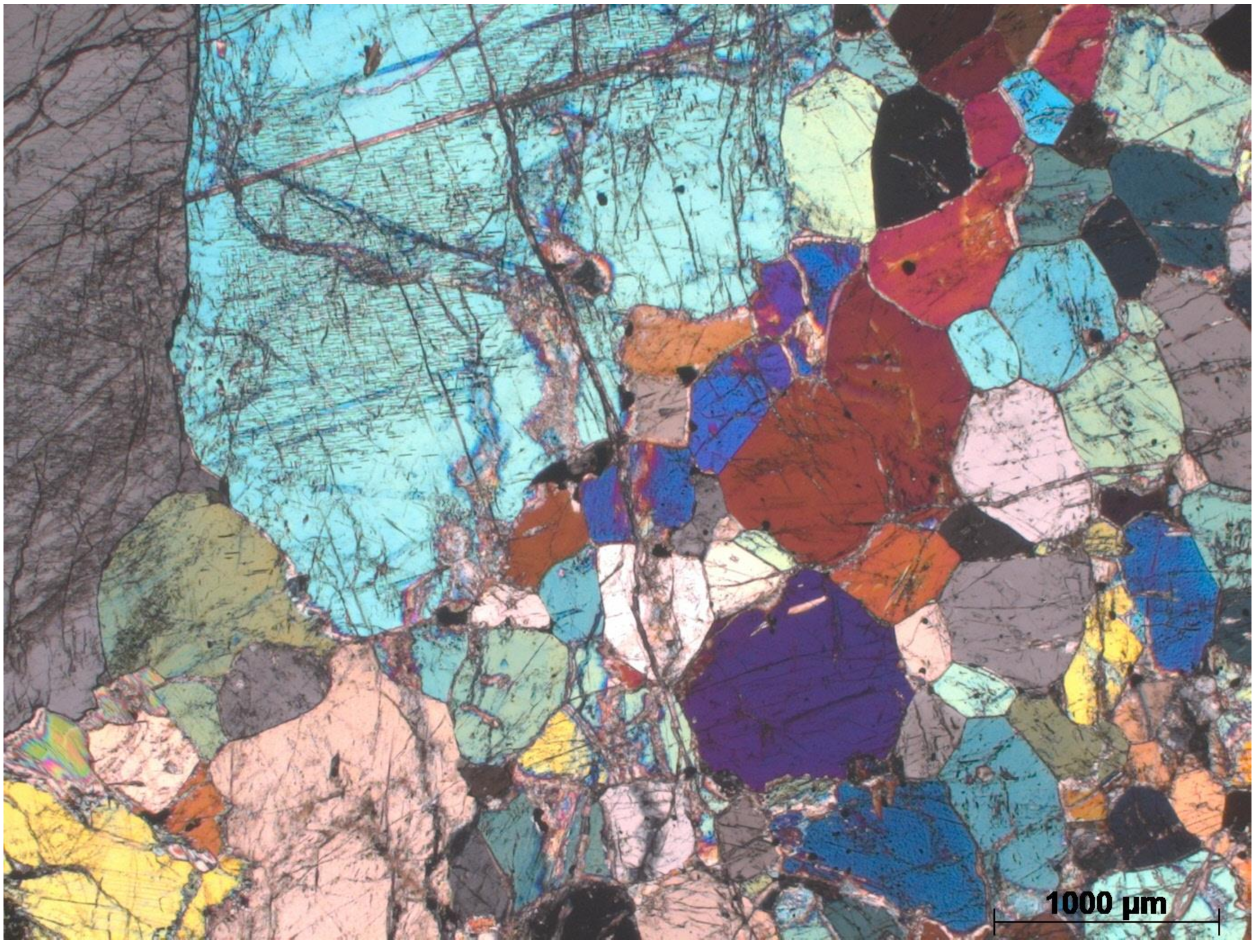
LT-9_93_48-93_56_50x_xpl_080	Clinopyroxenite

Thin Section Image 80. The same image as thin section image 79 but under crossed-polarized light reveals bright, second-order yellow orange, purple, and bright green interference colors of the augite-clinopyroxene. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



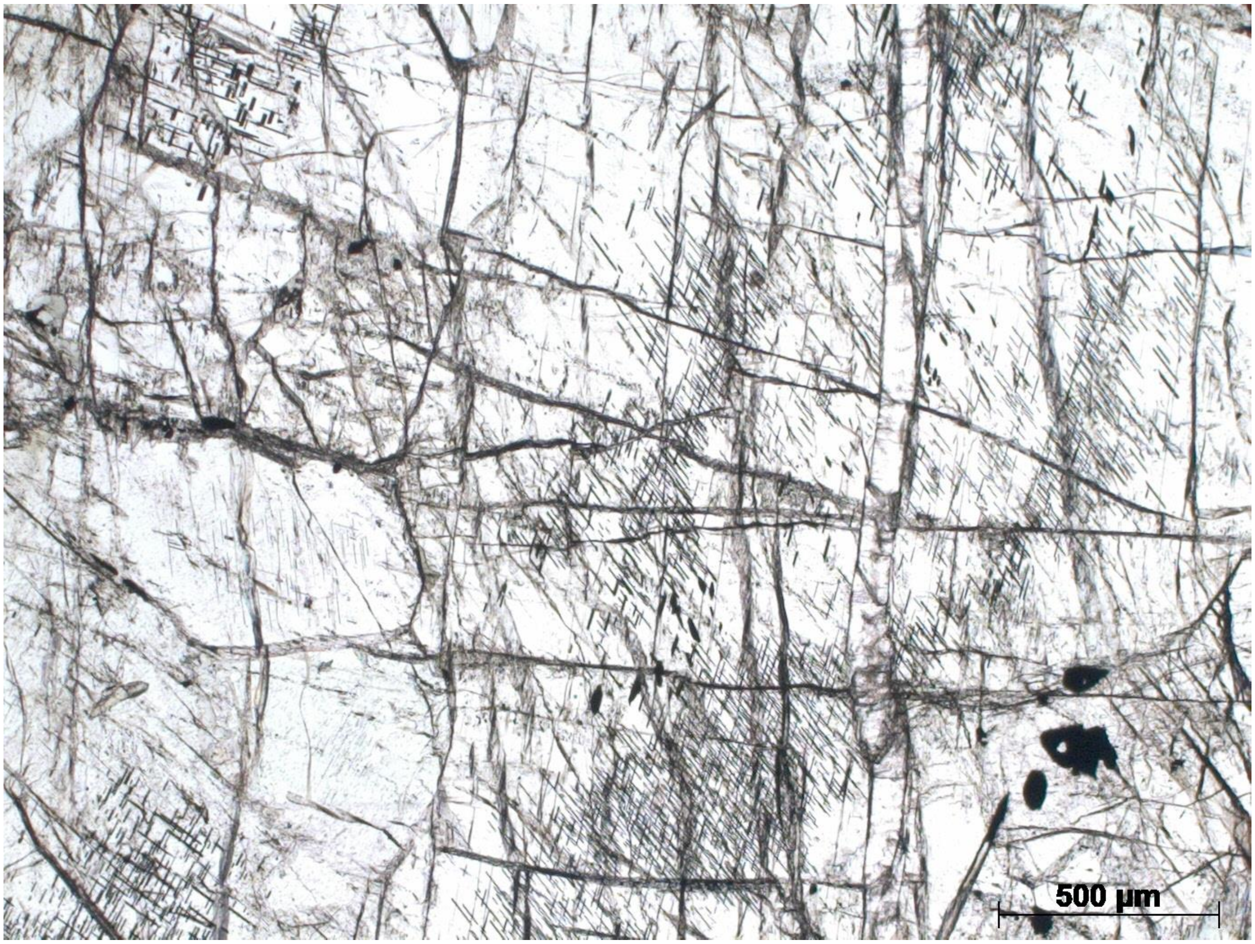
LT-11_28_58-28_67_2_5x_ppl_081	Clinopyroxenite

Thin Section Image 81. Low magnification overview of a clinopyroxenite reveals colorless, coarsely-crystalline augite-clinopyroxene at left, and finely-crystalline olivine crystals at right Fractures and serpentine replacement/alteration is common throughout the rock. Plane-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.



LT-11_28_58-28_67_2_5x_xpl_082	Clinopyroxenite

Thin Section Image 82. The same photo as in thin section image 81 but taken under crossed-polarized light reveals bright, second order blue, green, and yellow interference colors of clinopyroxene. The serpentine shows very low, first-order gray and black. The olivine at right shows bright, upper second-order interference colors of purple, orange, blue, green, and yellow. Cross-polarized light. 2.5x Magnification. Field of View 5.5 mm. Scale bar = 1000 microns or 1 mm.

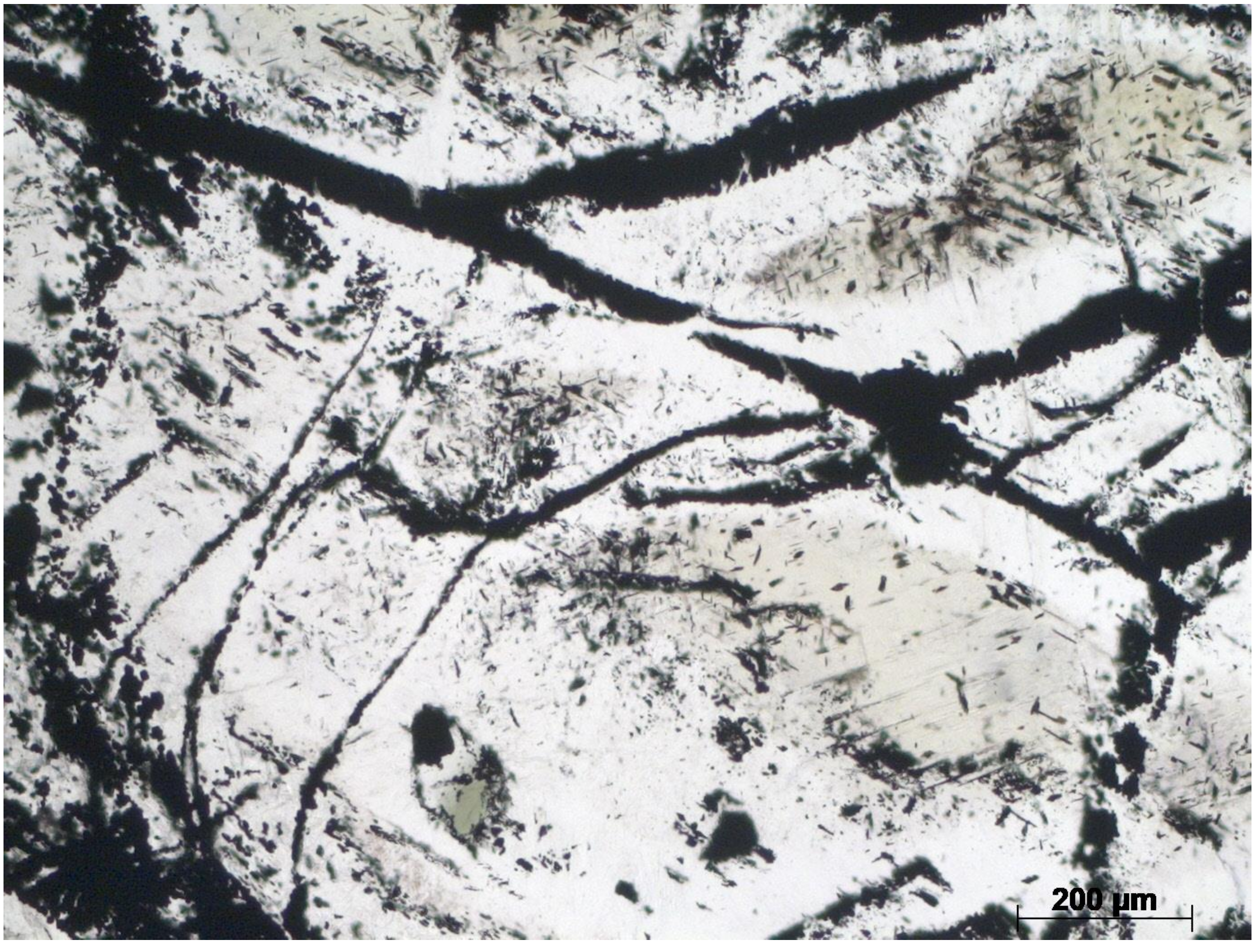


LT-11_28_58-28_67_5x_ppl_083	Clinopyroxenite

Thin Section Image 83. Increased magnification view of colorless, high-relief augite-clinopyroxene that hosts numerous fractures and low-relief serpentine fracture-fill. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.

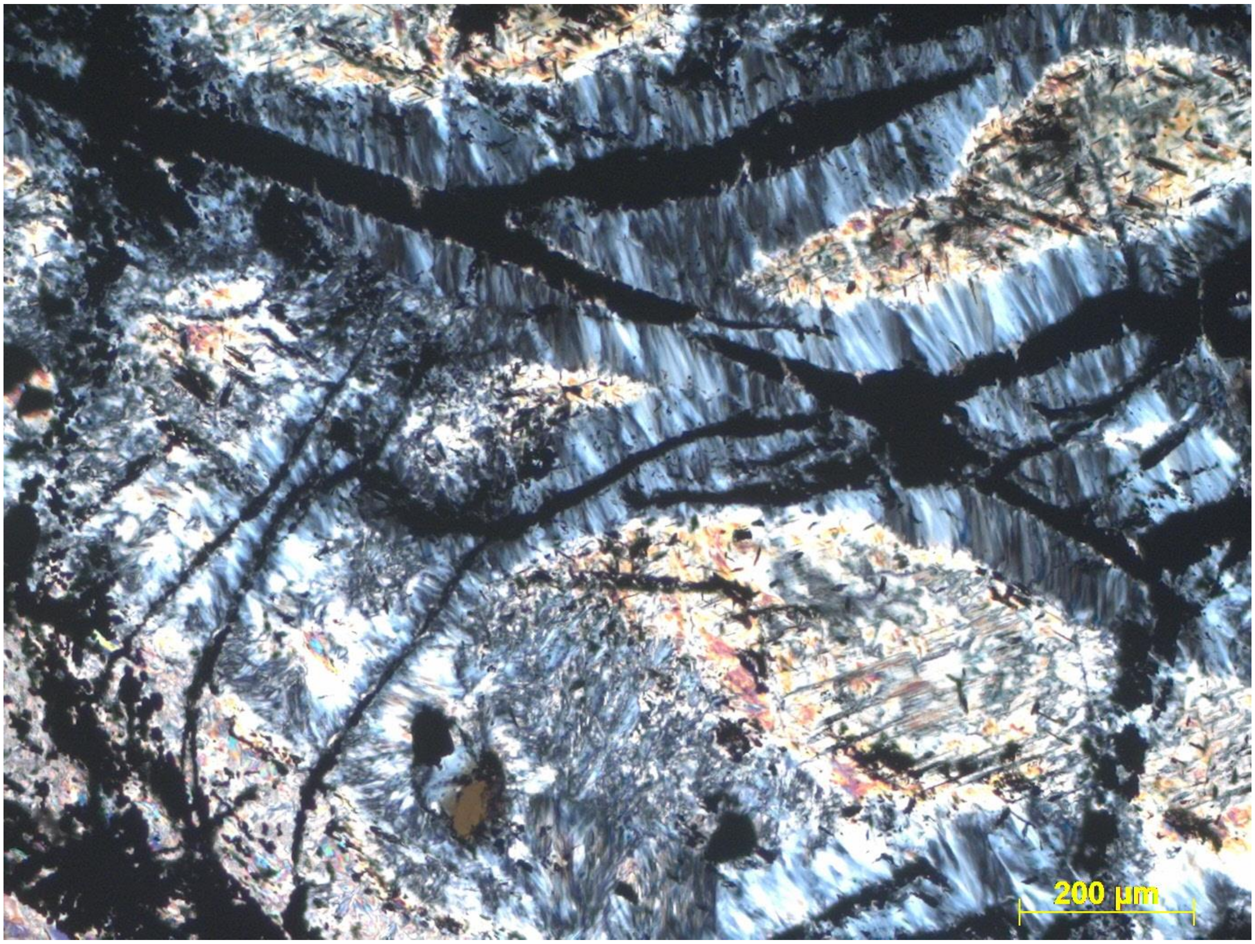
LT-11_28_58-28_67_5x_xpl_084	Clinopyroxenite

Thin Section Image 84. The same image as thin section image 83 but taken under crossed-polarized light illustrates the vibrant, second-order interference colors of the augite-clinopyroxene. Serpentine fracture-fill is noted from the low-relief gray-to-white interference colors. Plane-polarized light. 5x Magnification. Field of View 2.82 mm. Scale bar = 500 microns or 0.5 mm.



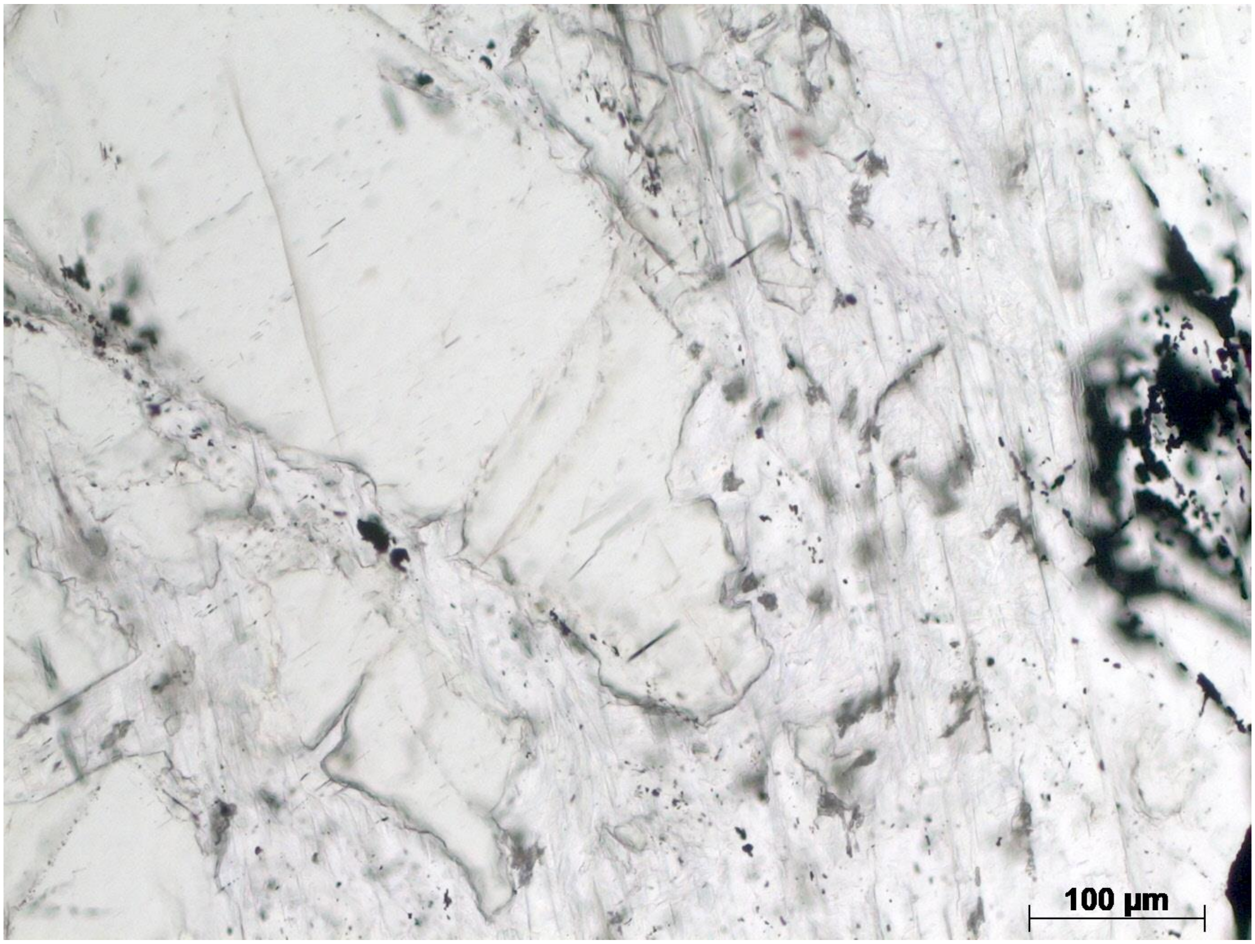
LT-11_28_58-28_67_10x_ppl_085	Clinopyroxenite

Thin Section Image 85. More magnified view of the clinopyroxene reveals a portion of the rock that was originally augite and is now heavily altered to uralite, serpentine, chlorite, and opaque magnetite. Plane-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



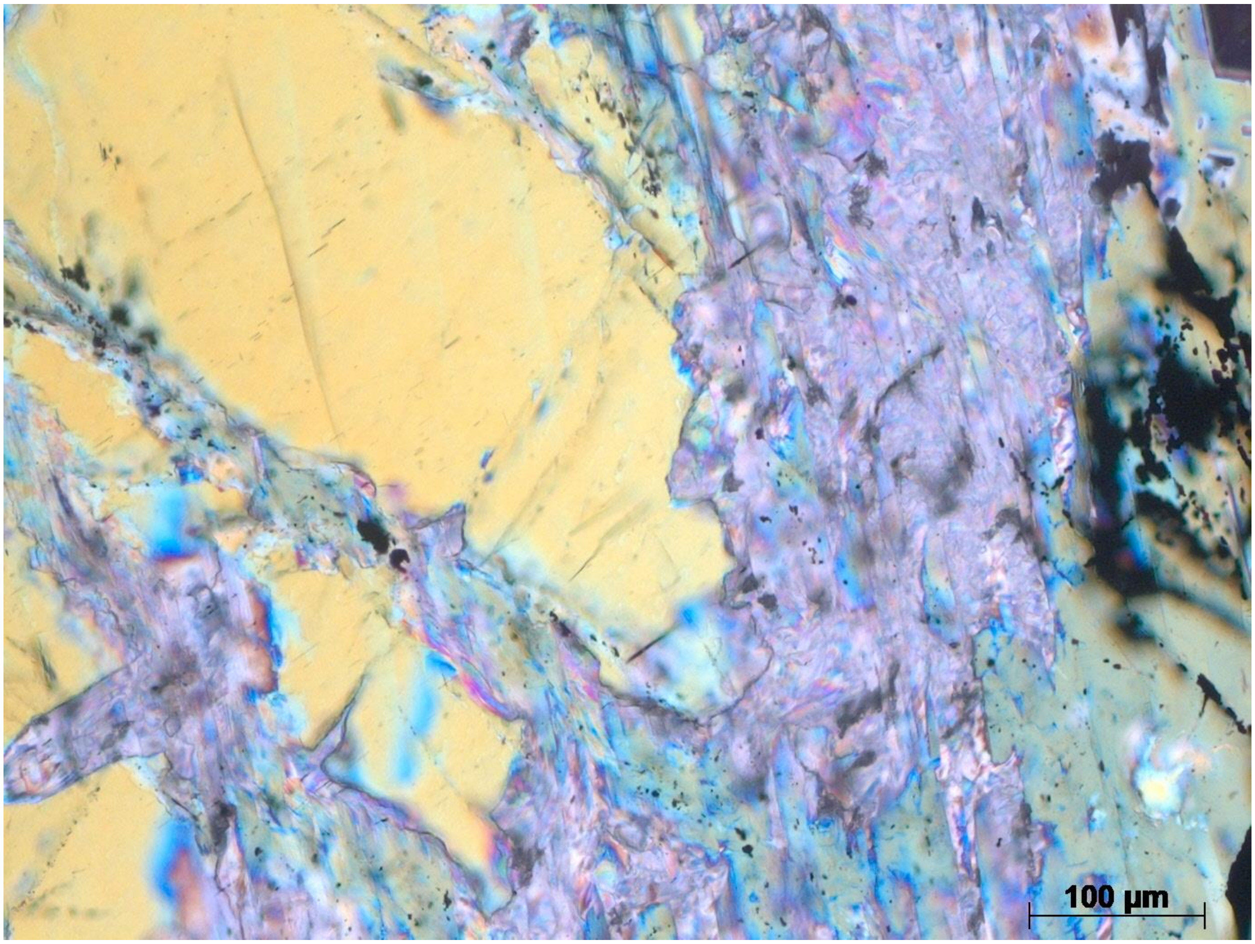
LT-11_28_58-28_67_10x_xpl_086	Clinopyroxenite

Thin Section Image 86. The same view as in thin section 85 but taken under crossed-polarized light to show the first-order white and grey inference colors of the serpentine and chlorite, as well as the white-to-yellow interference colors of the uralite. Cross-polarized light. 10x Magnification. Field of View 1.46 mm. Scale bar = 200 microns or 0.2 mm.



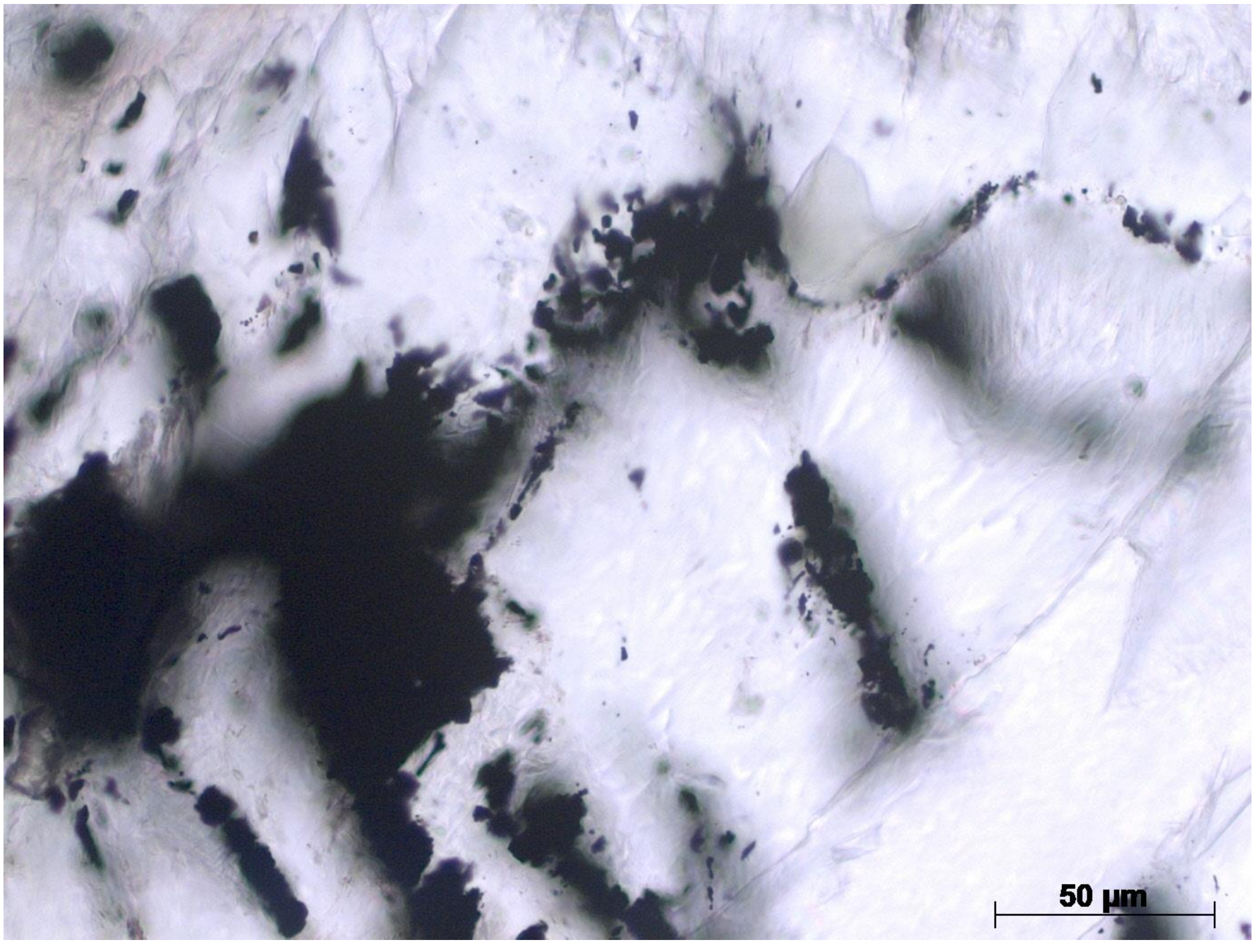
LT-11_28_58-28_67_20x_ppl_087	Clinopyroxenite

Thin Section Image 87. Closer inspection of the clinopyroxenite shows high-relief augite-clinopyroxenite at left and uralite alteration at right. Plane-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



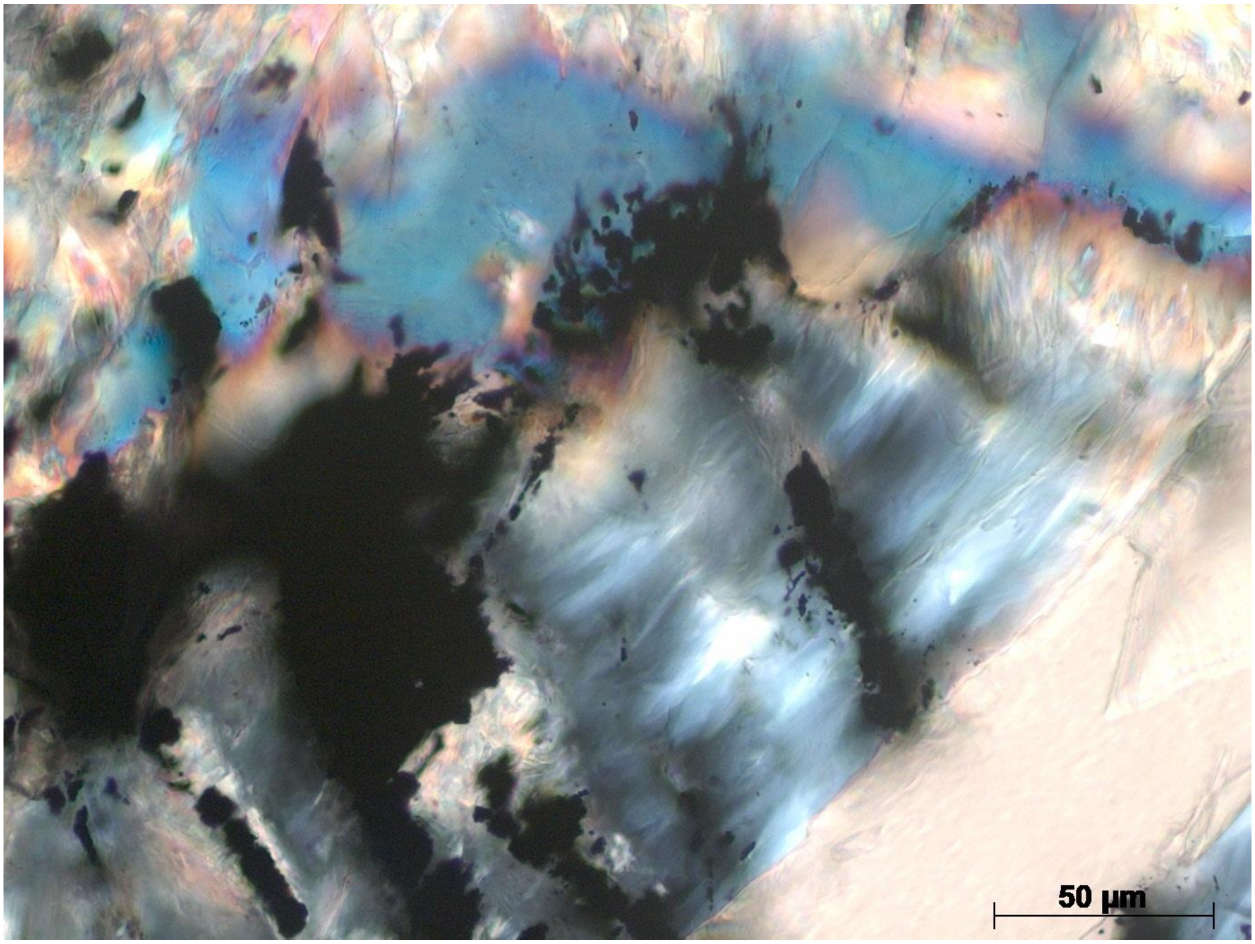
LT-11_28_58-28_67_20x_xpl_088	Clinopyroxenite

Thin Section Image 88. The same view of thin section 87 but under crossed-polarized light illustrates bright, second-order yellow and green interference colors of the augite-clinopyroxene, and vibrant rainbow-like interference colors of the uralite. Cross-polarized light. 20x Magnification. Field of View 0.72 mm. Scale bar = 100 microns or 0.1 mm.



LT-11_28_58-28_67_50x_ppl_089	Clinopyroxenite

Thin Section Image 89. Higher magnification view of the clinopyroxenite reveals fibrous-like serpentine, uralite, and opaque magnetite replacement of augite-clinopyroxene. Plane-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.



LT-11_28_58-28_67_50x_xpl_090	Clinopyroxenite

Thin Section Image 90. The same image as thin section image 89 but under crossed-polarized light reveals low, first-order gray and white interference colors of serpentine, and vibrant, rainbow-like interference colors of the uralite. Cross-polarized light. 50x Magnification. Field of View 0.28 mm. Scale bar = 50 microns or 0.05 mm.

ANALYTICAL PROCEDURES

Thin Section Analysis

Core samples were cut, surfaced, mounted to standard (24 mm × 46 mm) thin section slides, and ground to a thickness of approximately 30 microns by National Petrographic. The samples were then shipped to Ryan McLin, sole proprietor of McLin Petrographics. The prepared thin sections were examined and digitally imaged at various magnifications using a Carl Zeiss Axio Imager.A2m polarizing binocular microscope equipped with an AxioCam MRc digital camera, X-Cite Series 120Q high intensity mercury vapor short arc lighting system, and various UV light filters. The following Carl Zeiss objectives were used: EC-Epiplan-NEOFLUAR 2.5x, 5x, 10x, 20x, and 50x. Five images at increasing steps in magnification were collected for each thin section in both plane-polarized light and in crossed-polarized light to observe mineral characteristics and identifying features.

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