APPENDIX F.6

UNCONFINED COMPRESSIVE STRENGTH TESTS ON ROCK CORE WITH STRESS STRAIN MEASUREMENTS

NORTH ANNA COL

DATA REPORT REV. 0
JANUARY 23, 2007

MACTEC PROJECT NO. 6468-06-1472

Tice, Al

From: Davie, John [jdavie@bechtel.com]
Sent: Wednesday, November 29, 2006 8:08 AM
To: Tice, Al
Cc: Baker, Richard
Subject: RE: Rock cores

Al,

For the chipped cores, I would go ahead and test them, and make a note about the chipping somewhere in the results sheet. If you think the fracture in the one core will significantly impact the result, then I would not test it.

John

From: Tice, Al [mailto:JATICE@mactec.com]
Sent: Wednesday, November 29, 2006 7:31 AM
To: Davie, John
Subject: Rock cores

The lab has noted the following cores that were damaged in the preparation process. The cores are weathered rock, and during the end preparation process, they developed chips on the core edge and one was fractured. Due to the nature of this rock, any rock resubmitted of the same type, would probably yield the same results. Please advise.

B907 90.0 UCSS

B920 90.15 UC

B910 91.1 UCSS

B907 51.85 UC

B901 117.45 UCSS fractured; not tested JAJ 1-19-07

J. Allan Tice, P. E.

Senior Principal/Assistant Vice President

MACTEC

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MACTEC

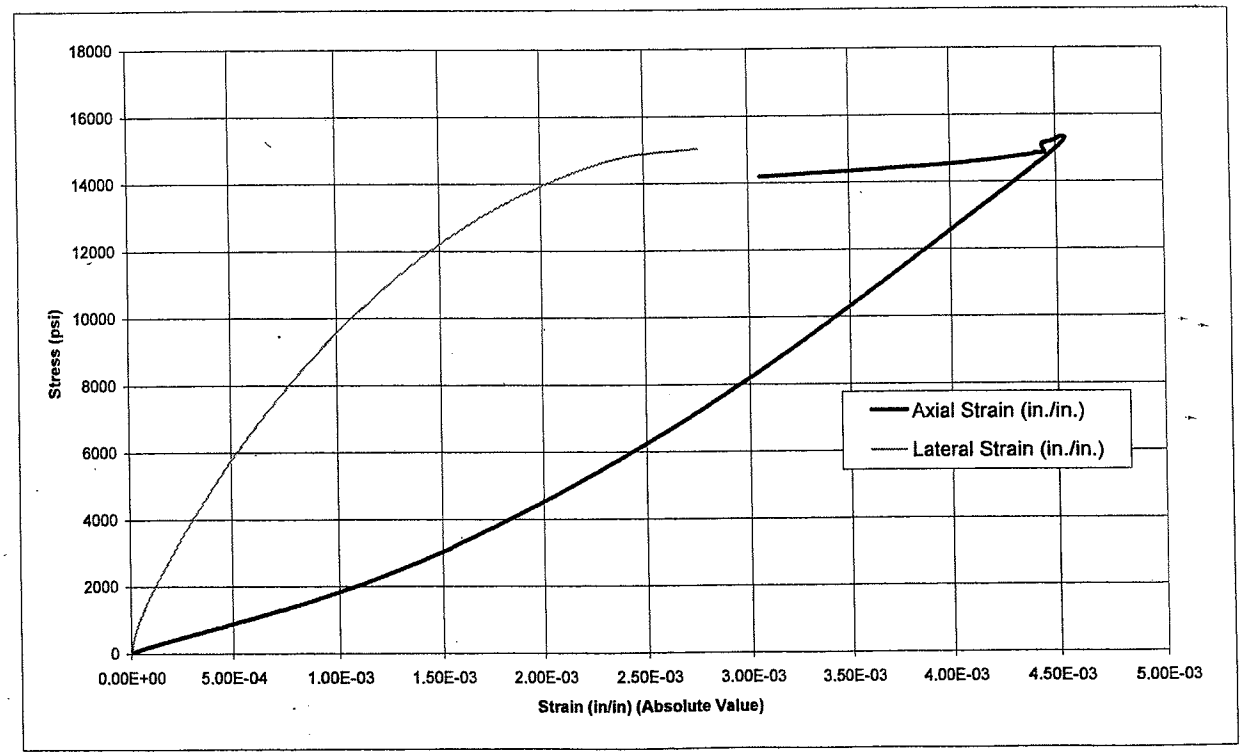
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

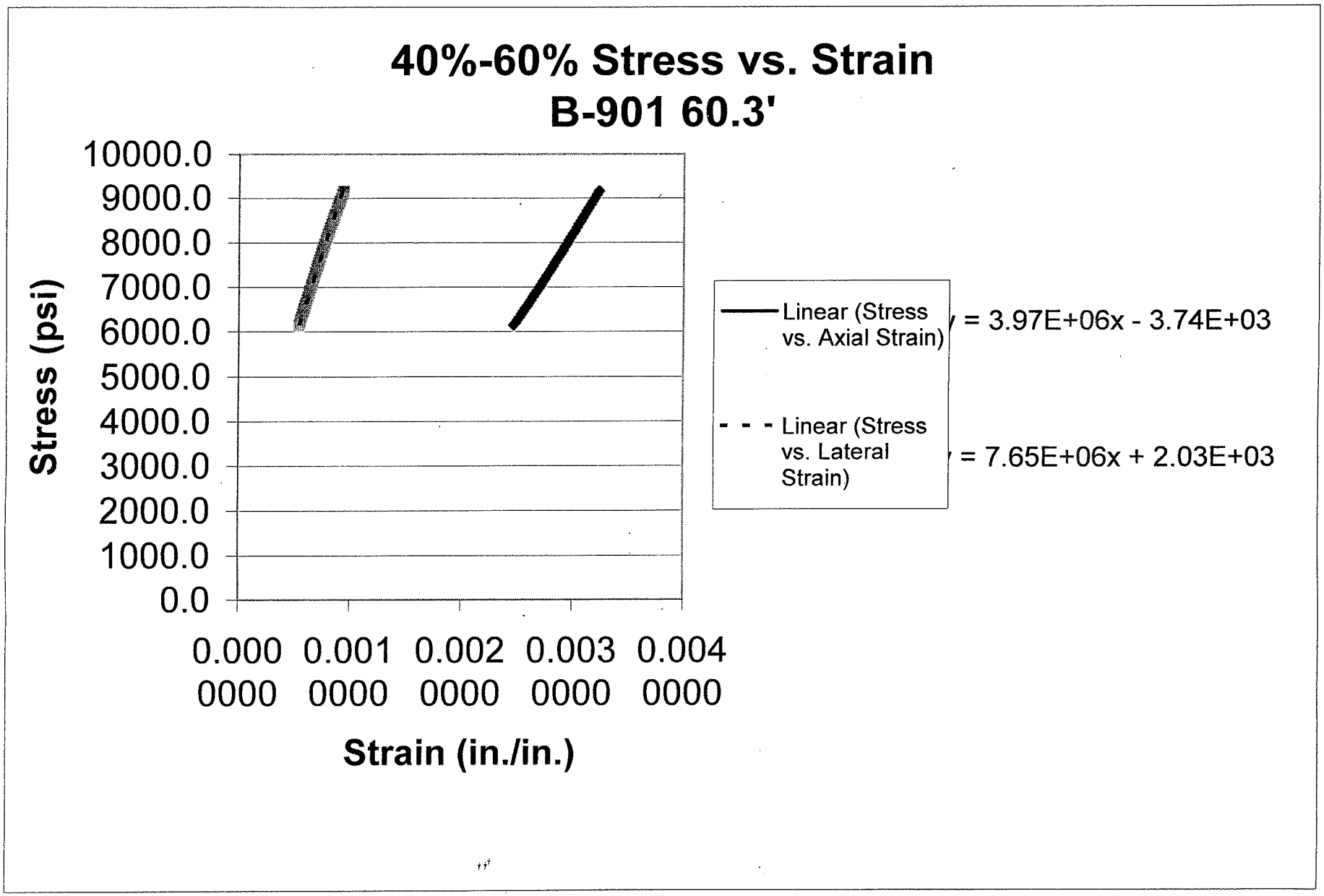
Project Name:	**North Anna**
Project Number:	**6468061472**
Boring Number:	**901**
Sample Depth (ft):	**60.3**
Tested By:	**Jacob B. Mock**
Test Date:	**12/1/2006**

Reviewed By: DSC
Review Date: 1-19-07

Rock Type	Quartz Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.490**
Specimen Length, inch	**5.275**
Length/Diameter Ratio	**2.12**
Unit Weight (lbs/ft^3)	**162**
Test Duration (Time to Failure in Minutes)	**7.1**
Unconfined Compressive Strength, psi (from test)	**15,322**
Unconfined Compressive Strength, psi (with L/D correction)	**15,425**
Type of Break	**Columnar**
Young's Modulus, psi	**3,970,000**
Poisson's Ratio	*



Comments: Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive. * = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.


40%-60% Stress vs. Strain
B-901 60.3'
Stress (psi)
10000.0
9000.0
8000.0
7000.0
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
0.000 0000
0.001 0000
0.002 0000
0.003 0000
0.004 0000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 3.97E+06x - 3.74E+03
Linear (Stress vs. Lateral Strain)
y = 7.65E+06x + 2.03E+03

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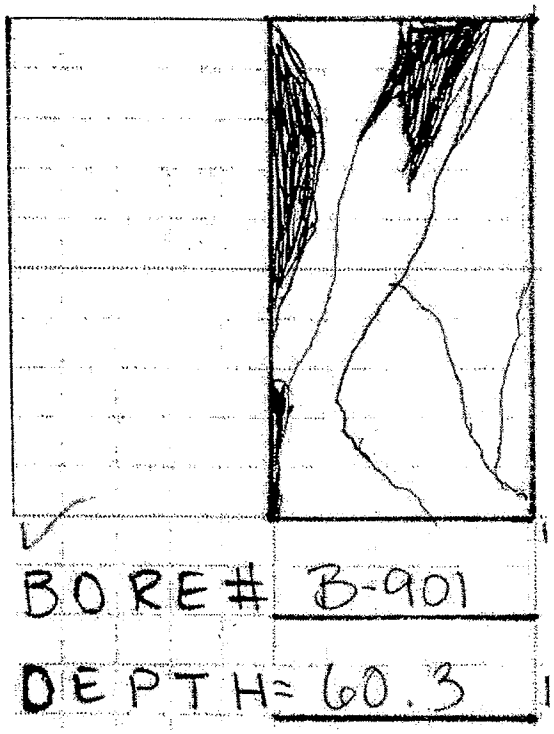
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	901		
Sample Depth (ft):	60.3		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/1/2006	**Review Date:**	12/12/2006



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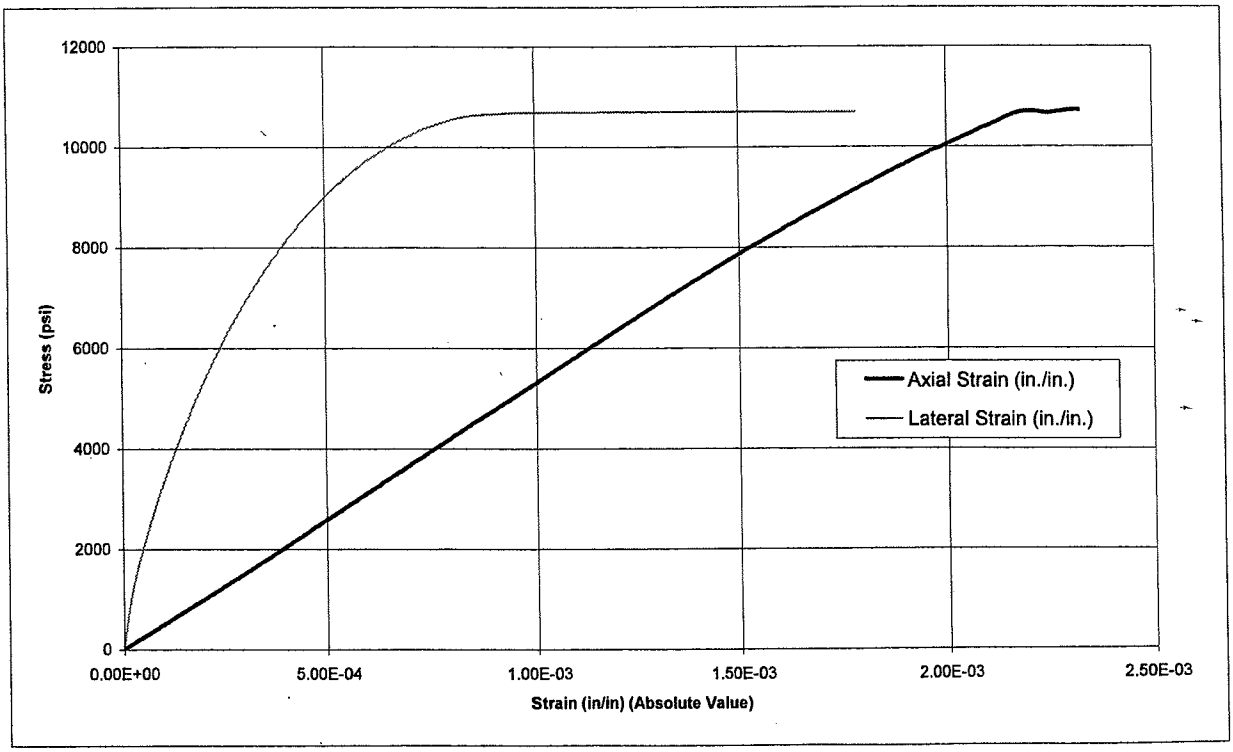
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

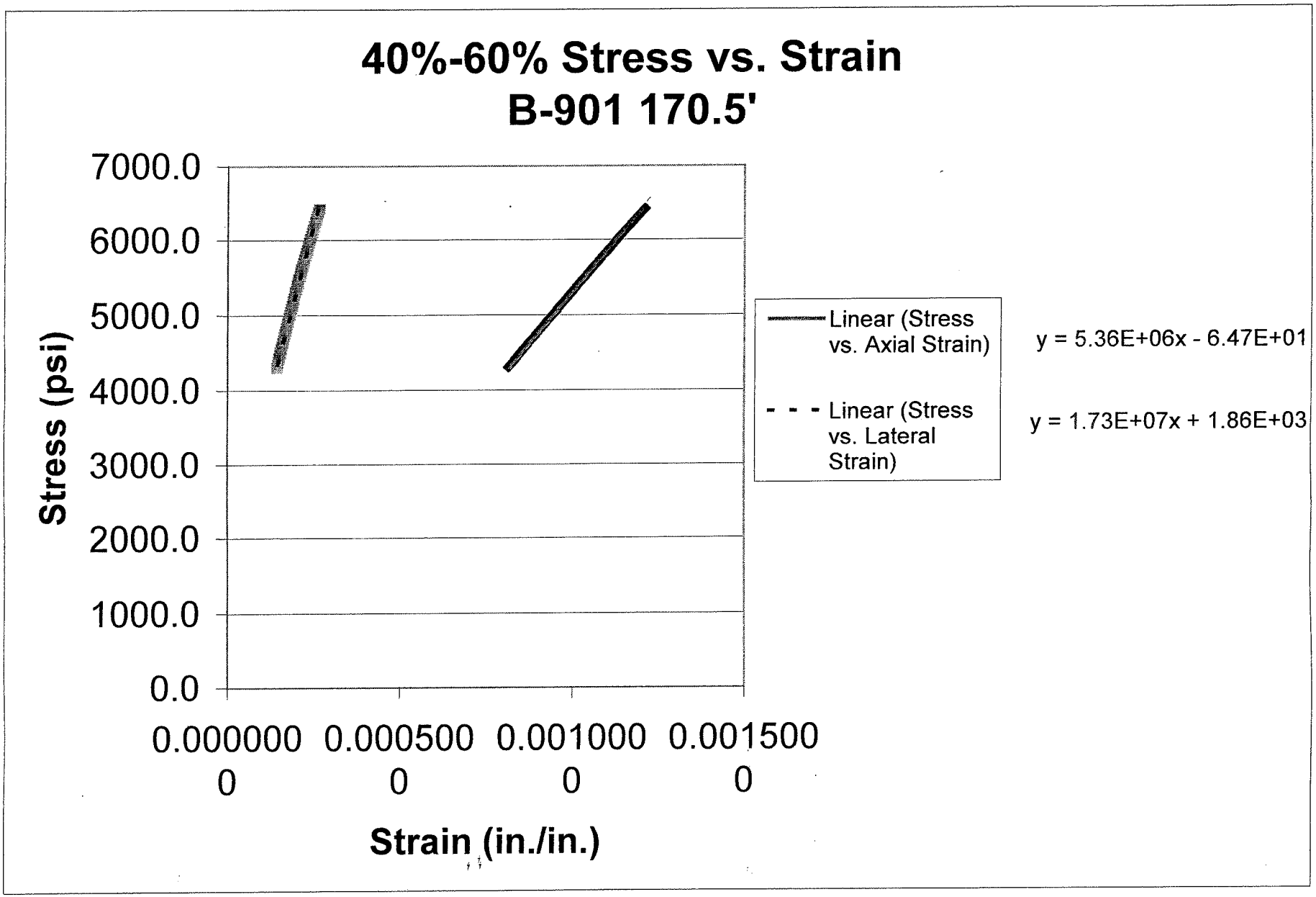
ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	901		
Sample Depth (ft):	170.5		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/5/2006	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.398
Specimen Length, inch	5.332
Length/Diameter Ratio	2.22
Unit Weight (lbs/ft^3)	168
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	10,734
Unconfined Compressive Strength, psi (with L/D correction)	10,865
Type of Break	Shear
Young's Modulus, psi	5,360,000
Poisson's Ratio	0.31



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-901 170.5'
7000.0
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
Stress (psi)
0.000000
0.000500
0.001000
0.001500
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 5.36E+06x - 6.47E+01
y = 1.73E+07x + 1.86E+03

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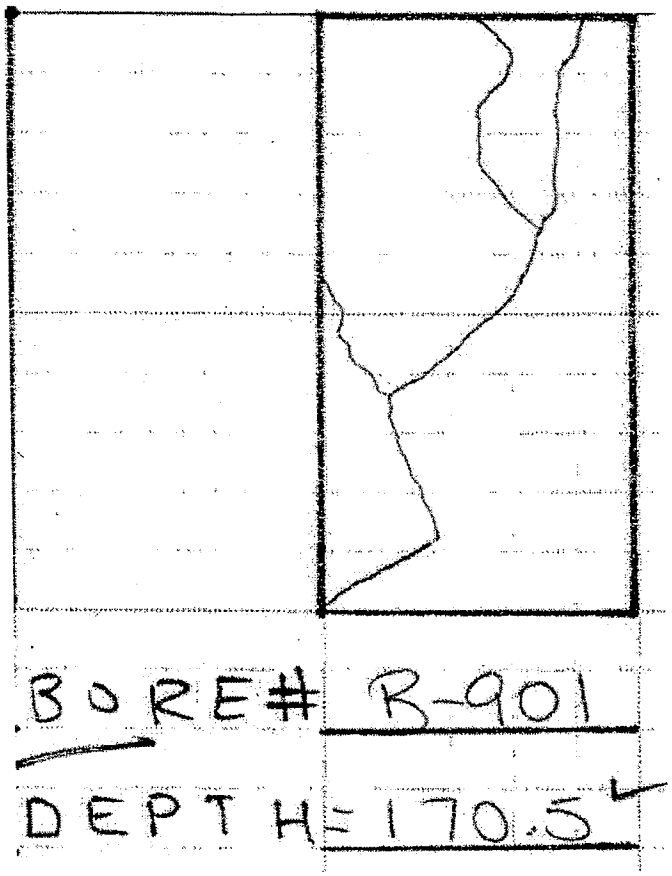
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**901**		
Sample Depth (ft):	**170.5**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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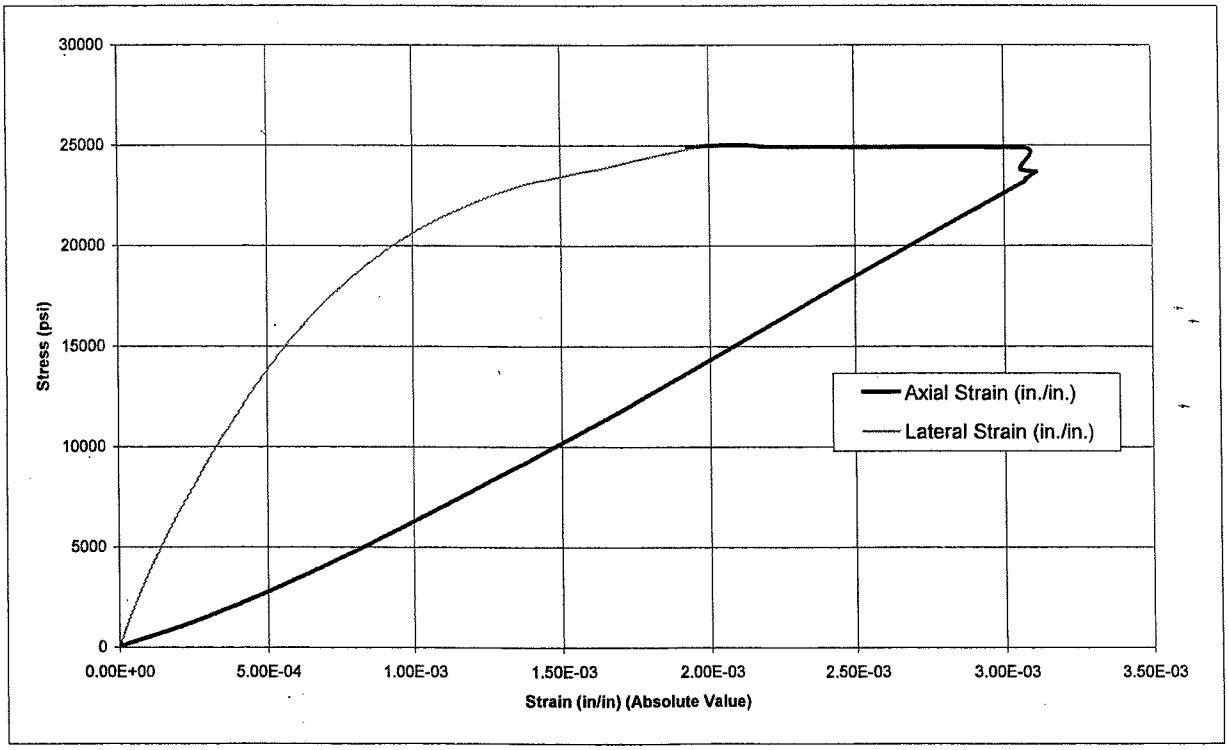
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

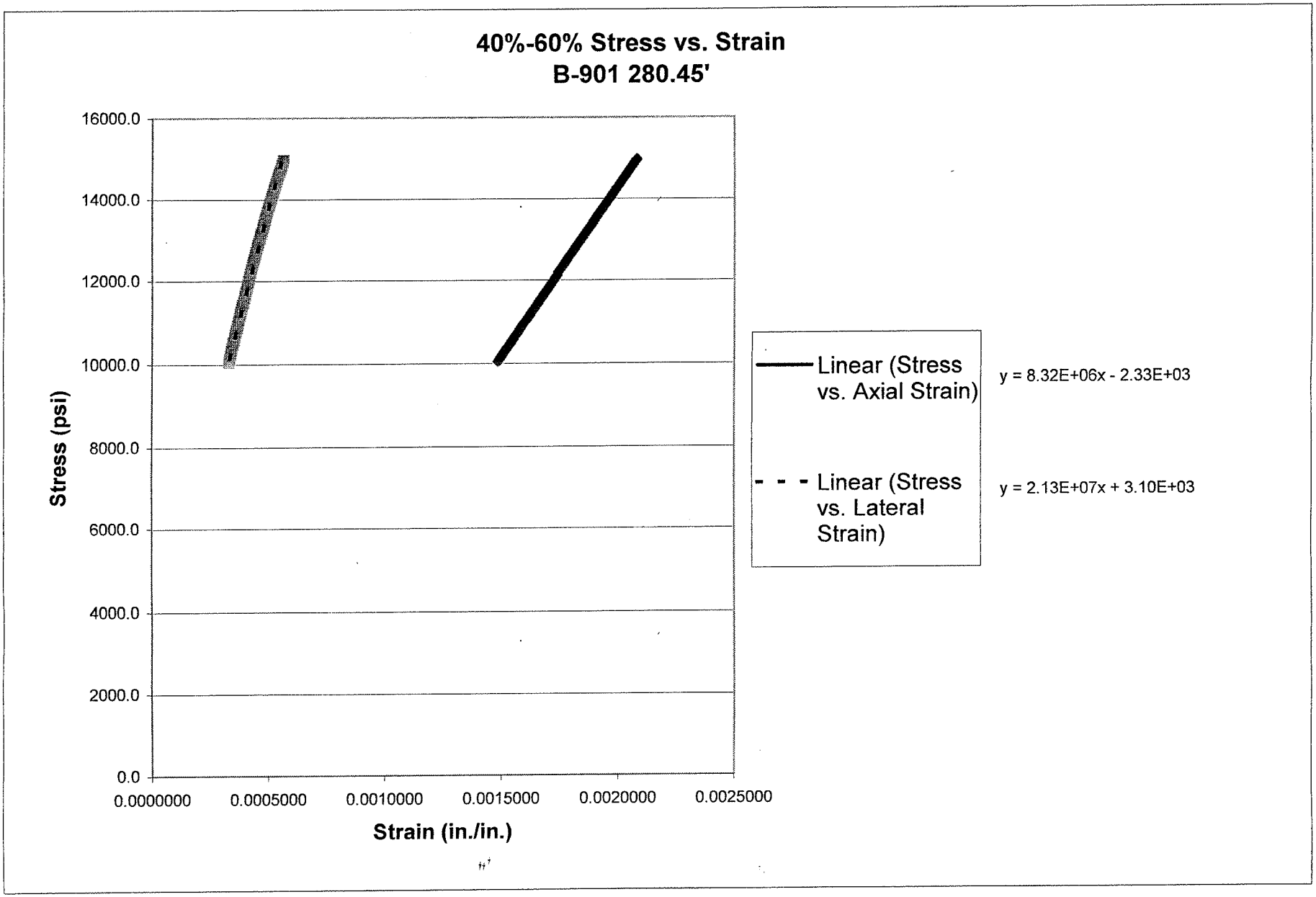
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**901**		
Sample Depth (ft):	**280.45**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DJC
Test Date:	**12/5/2006**	**Review Date:**	1-19-07

Rock Type	**Biotite-Quartz Gneiss**
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.394**
Specimen Length, inch	**5.357**
Length/Diameter Ratio	**2.24**
Unit Weight (lbs/ft^3)	**164**
Test Duration (Time to Failure in Minutes)	**10.6**
Unconfined Compressive Strength, psi (from test)	**25,013**
Unconfined Compressive Strength, psi (with L/D correction)	**25,335**
Type of Break	**Cone & Shear**
Young's Modulus, psi	**8,320,000**
Poisson's Ratio	**0.39**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-901 280.45'
Stress (psi)
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.0000000
0.0005000
0.0010000
0.0015000
0.0020000
0.0025000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 8.32E+06x - 2.33E+03
Linear (Stress vs. Lateral Strain)
y = 2.13E+07x + 3.10E+03

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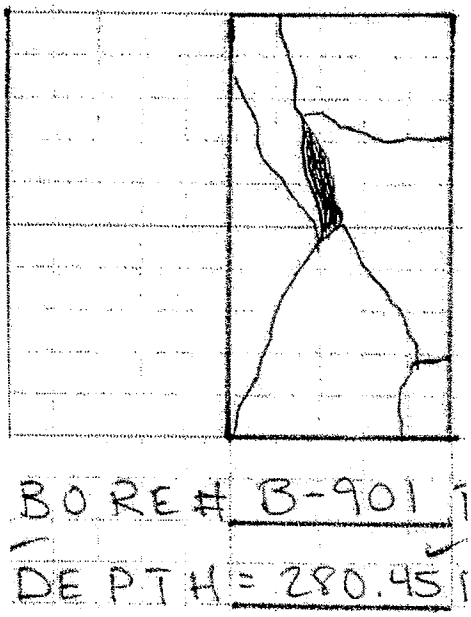
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**901**		
Sample Depth (ft):	**280.45**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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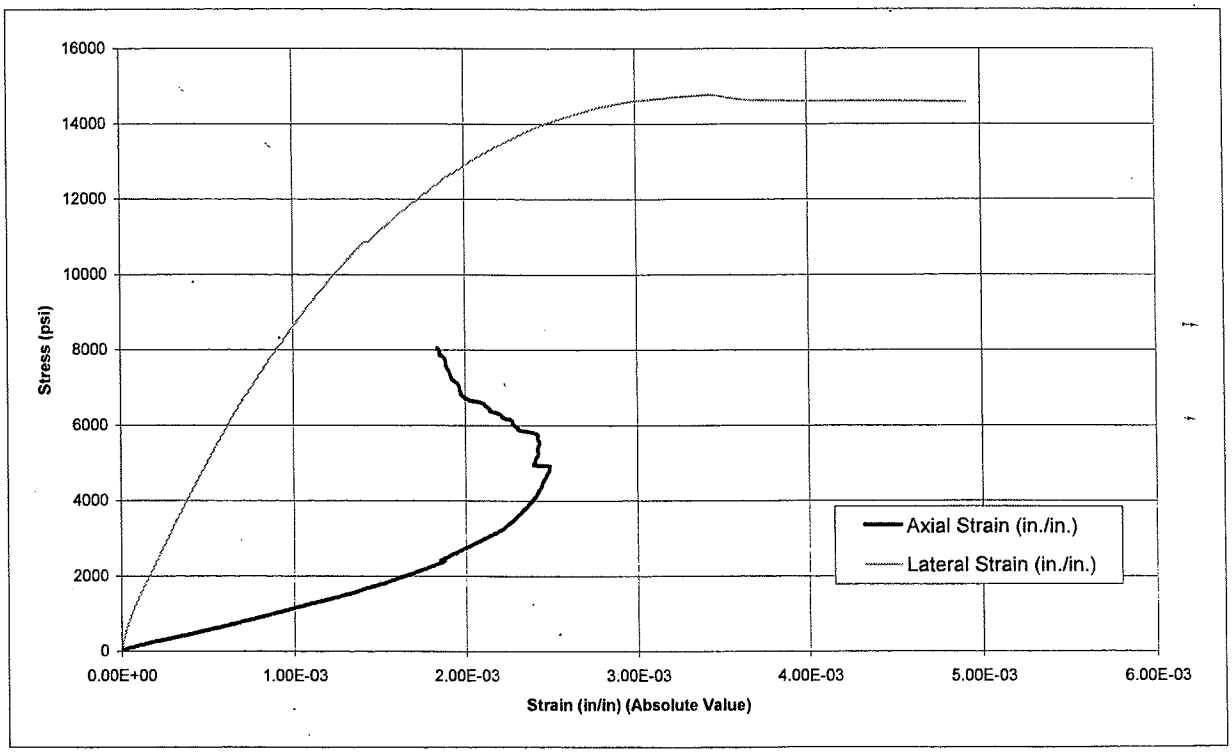
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**902**		
Sample Depth (ft):	**27.25**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DJC
Test Date:	**12/7/2006**	**Review Date:**	1-19-07

Rock Type	**Quartz Gneiss**
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.384**
Specimen Length, inch	**5.288**
Length/Diameter Ratio	**2.22**
Unit Weight (lbs/ft^3)	**162**
Test Duration (Time to Failure in Minutes)	**6.8**
Unconfined Compressive Strength, psi (from test)	**14,771**
Unconfined Compressive Strength, psi (with L/D correction)	**14,947**
Type of Break	**Shear**
Young's Modulus, psi	**ND**
Poisson's Ratio	**ND**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.
ND = Axial strain gages failed prematurely during lab testing ; Young's modulus and Poisson's ratio not determined.

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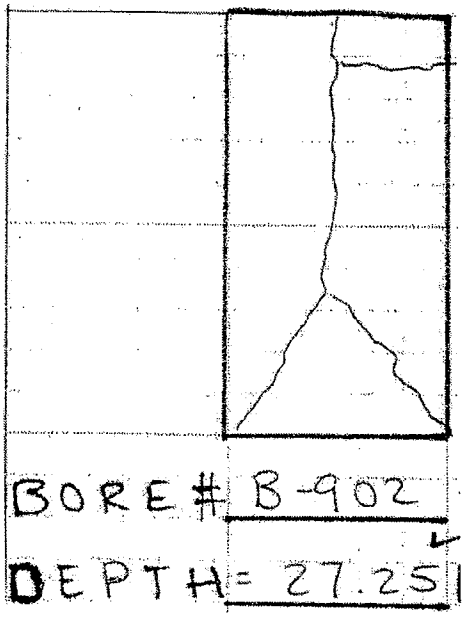
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**902**		
Sample Depth (ft):	**27.25**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/7/2006**	**Review Date:**	**12/12/2006**



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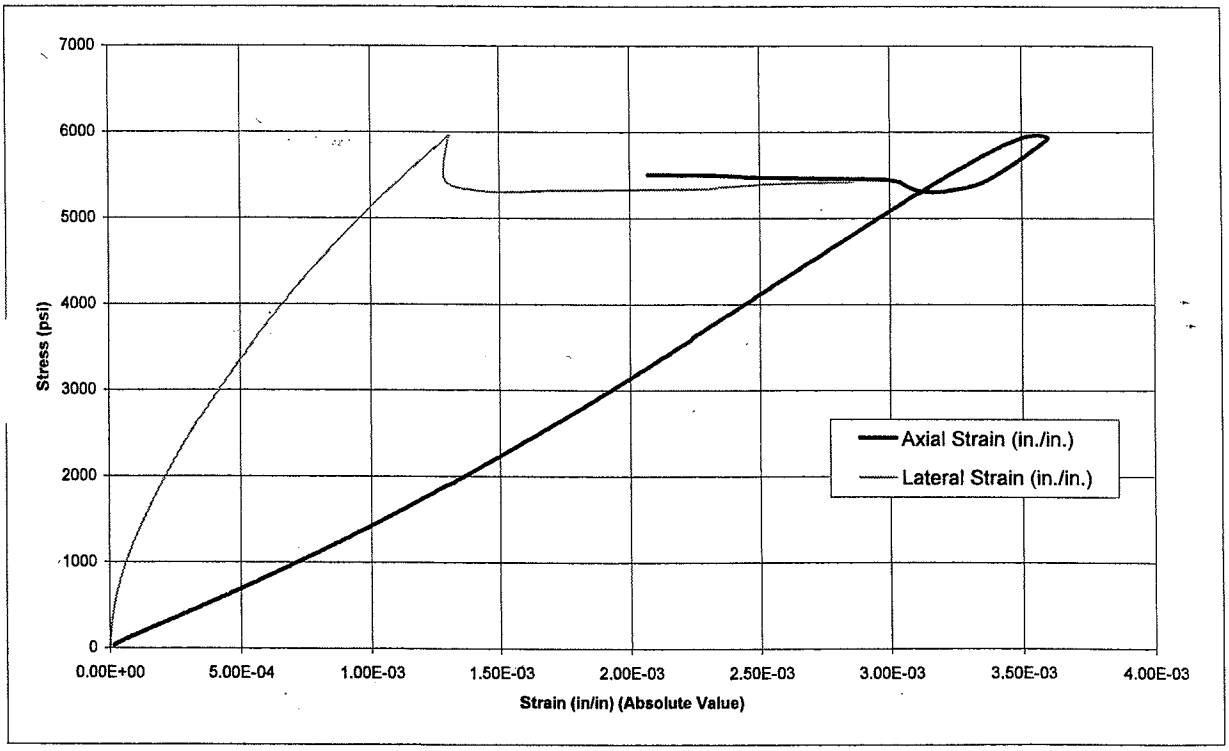
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

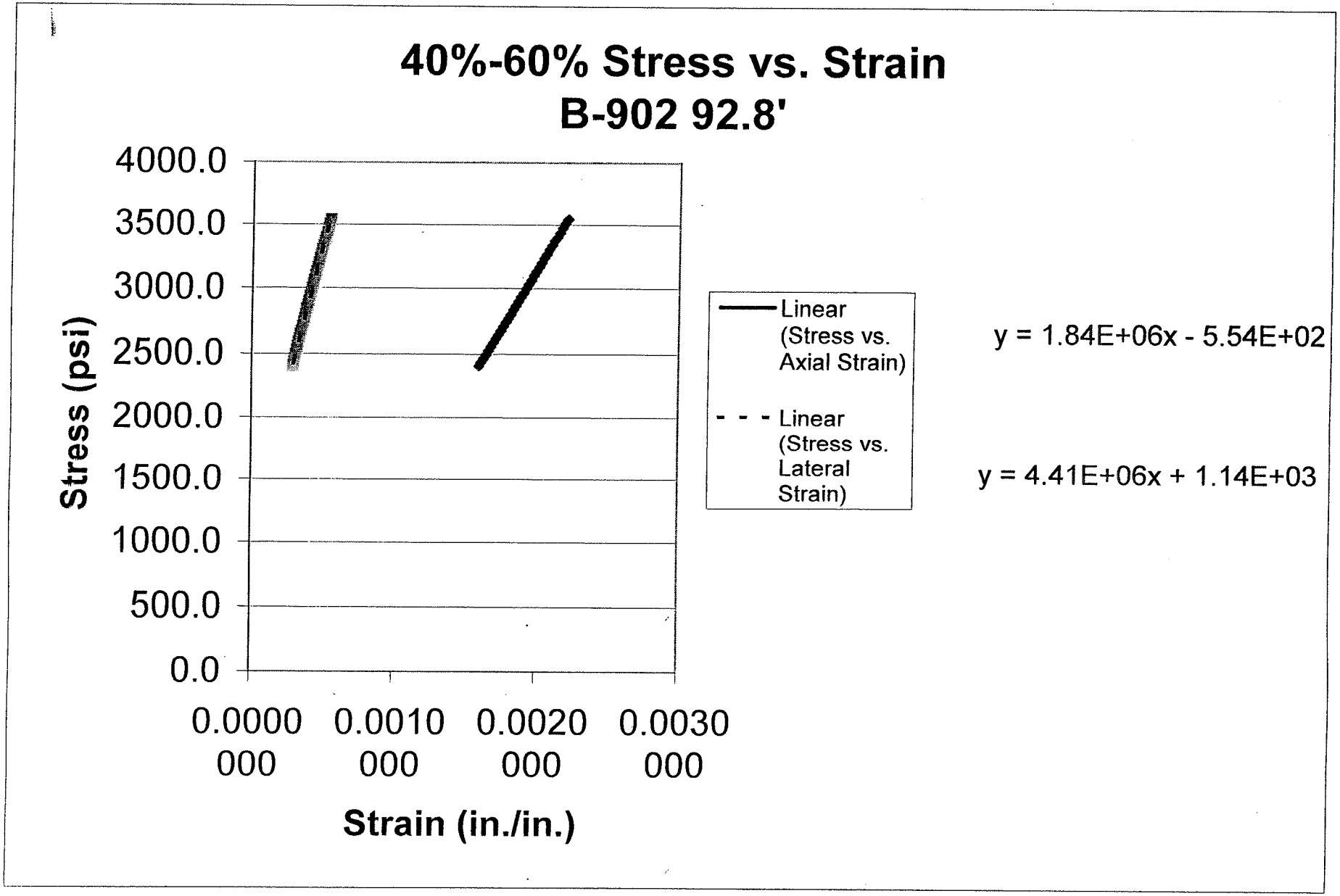
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**902**		
Sample Depth (ft):	**92.8**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.398**
Specimen Length, inch	**5.321**
Length/Diameter Ratio	**2.22**
Unit Weight (lbs/ft^3)	**164**
Test Duration (Time to Failure in Minutes)	**6.3**
Unconfined Compressive Strength, psi (from test)	**5,958**
Unconfined Compressive Strength, psi (with L/D correction)	**6,030**
Type of Break	**Shear**
Young's Modulus, psi	**1,840,000**
Poisson's Ratio	**0.42**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-902 92.8'
Stress (psi)
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000000
0.0010000
0.0020000
0.0030000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 1.84E+06x - 5.54E+02
y = 4.41E+06x + 1.14E+03

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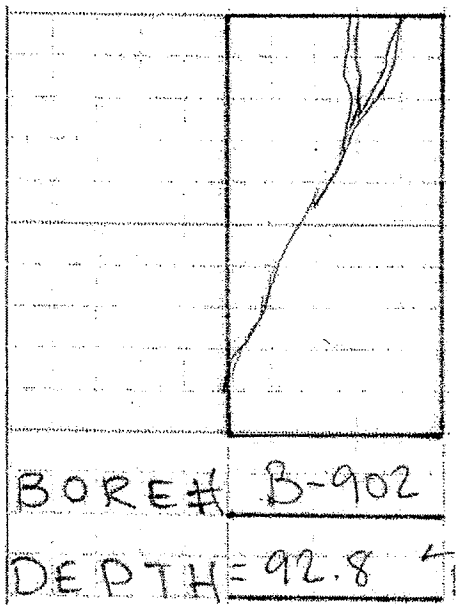
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**902**		
Sample Depth (ft):	**92.8**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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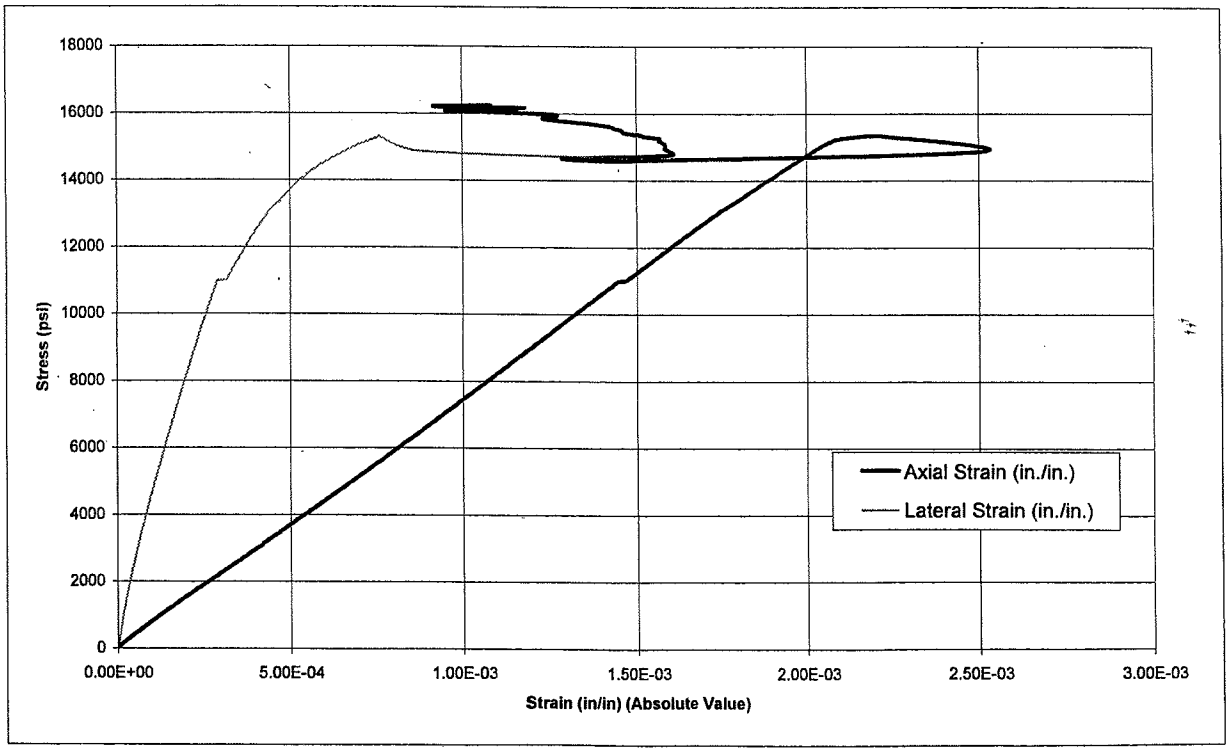
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

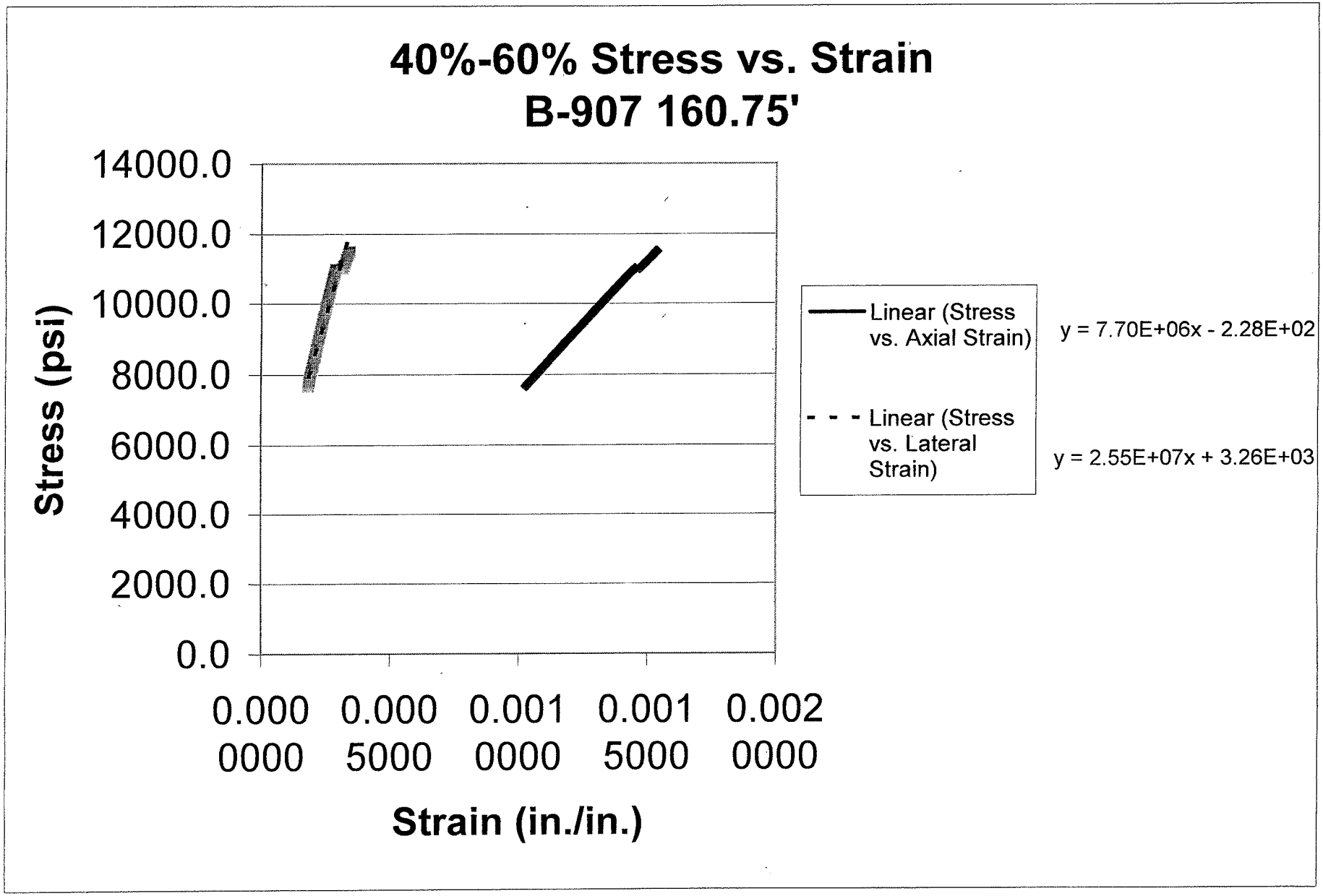
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**907**		
Sample Depth (ft):	**160.75**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.498**
Specimen Length, inch	**5.318**
Length/Diameter Ratio	**2.13**
Unit Weight (lbs/ft^3)	**163**
Test Duration (Time to Failure in Minutes)	**6.8**
Unconfined Compressive Strength, psi (from test)	**19,192**
Unconfined Compressive Strength, psi (with L/D correction)	**19,333**
Type of Break	**Columnar**
Young's Modulus, psi	**7,700,000**
Poisson's Ratio	**0.30**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-907 160.75'
Stress (psi)
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.000 0000
0.000 5000
0.001 0000
0.001 5000
0.002 0000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 7.70E+06x - 2.28E+02
Linear (Stress vs. Lateral Strain)
y = 2.55E+07x + 3.26E+03

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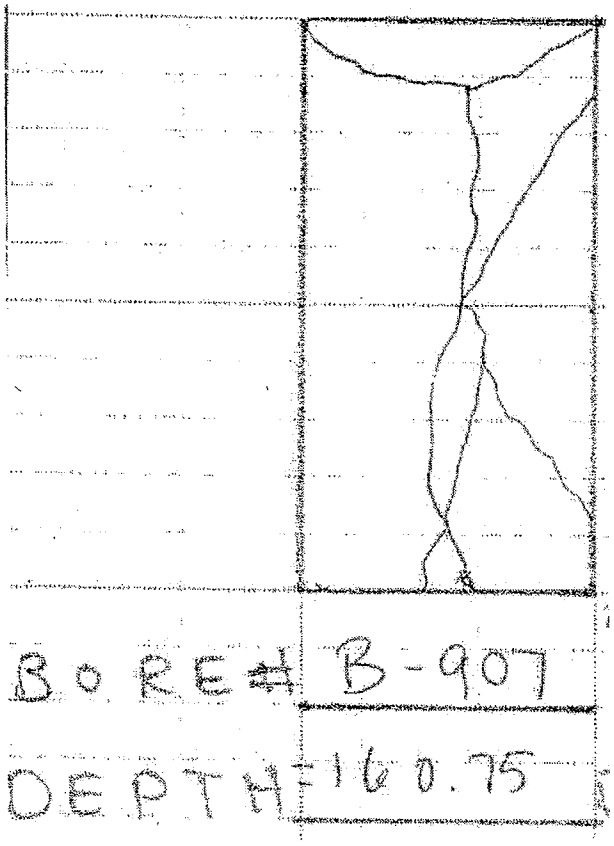
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**907**		
Sample Depth (ft):	**160.75**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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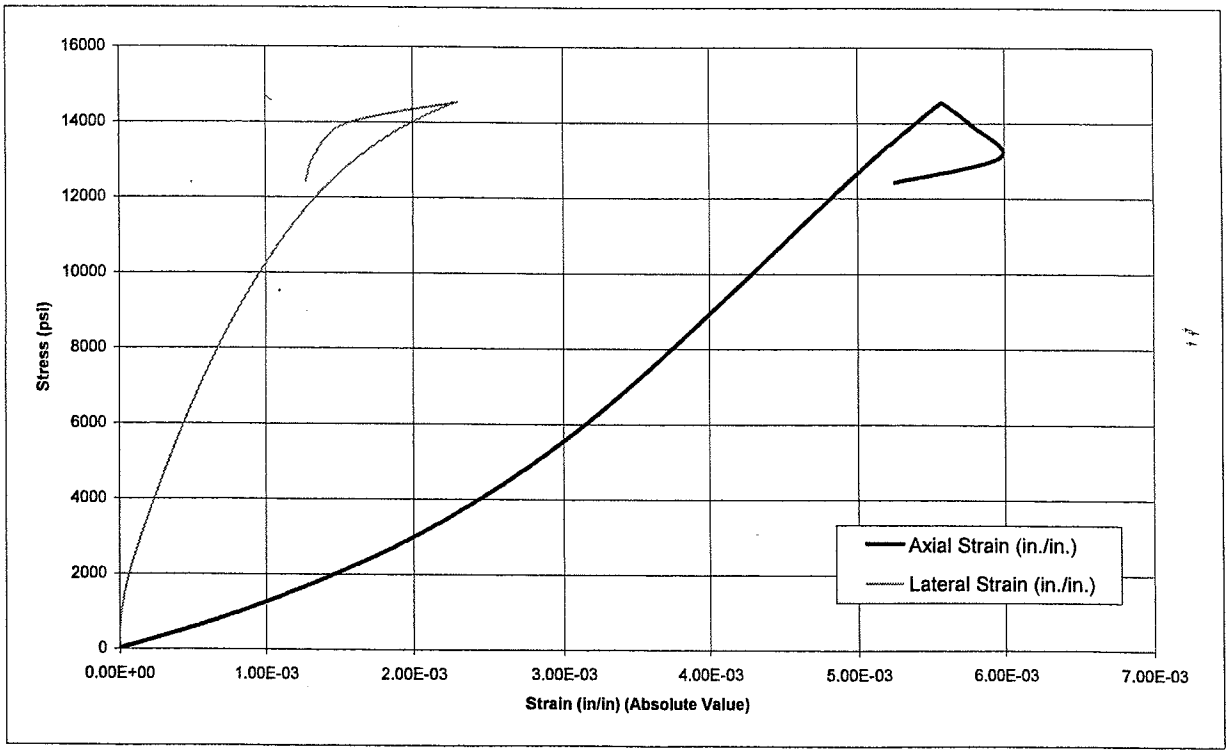
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

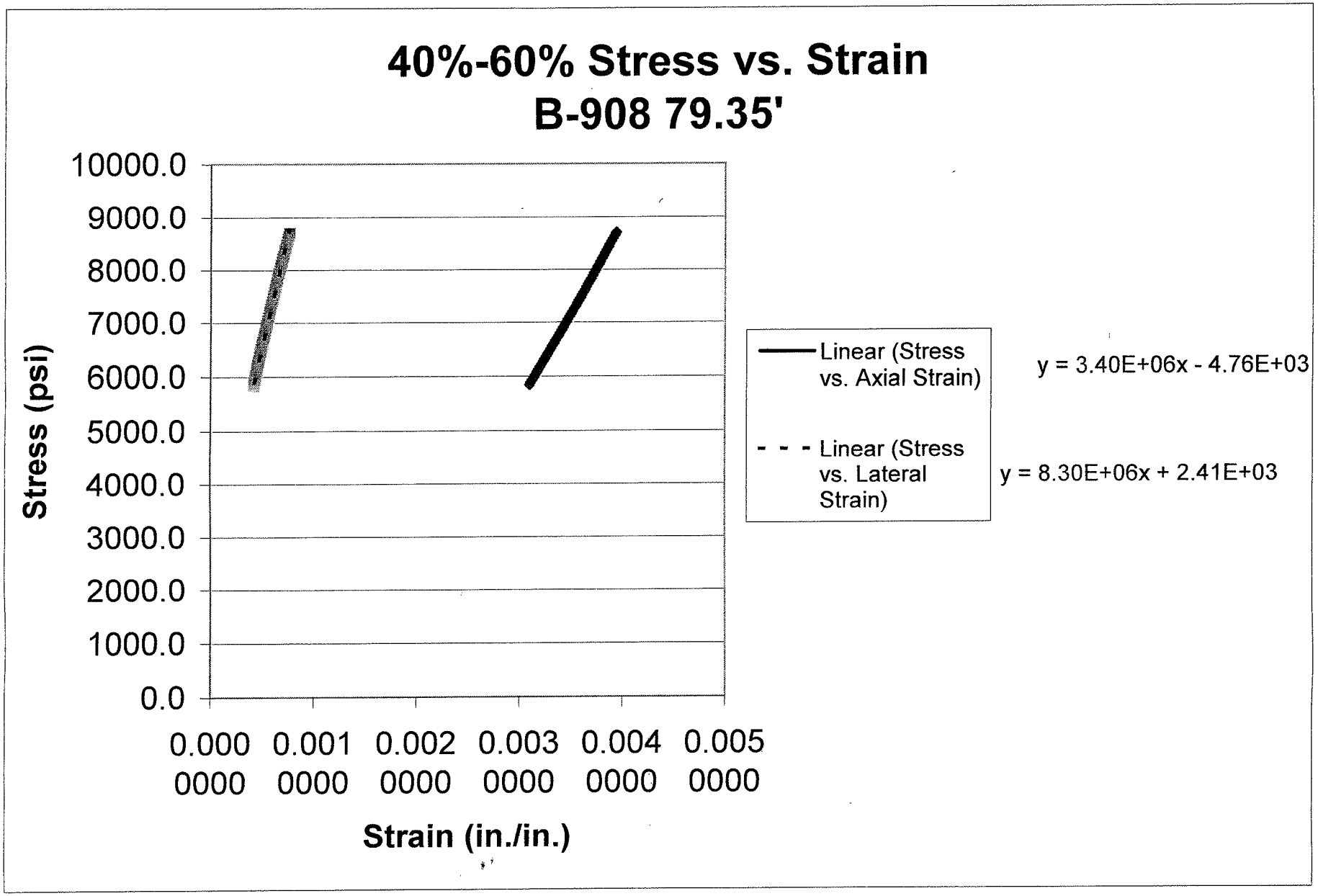
ASTM D 7012-04

Project Name:	North Anna COL		
Project Number:	6468061472		
Boring Number:	908		
Sample Depth (ft):	79.35		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/13/2006	**Review Date:**	1-19-07

Rock Type	Quartz Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.391**
Specimen Length, inch	**5.248**
Length/Diameter Ratio	**2.20**
Unit Weight (lbs/ft^3)	**164**
Test Duration (Time to Failure in Minutes)	**9.1**
Unconfined Compressive Strength, psi (from test)	**14,538**
Unconfined Compressive Strength, psi (with L/D correction)	**14,695**
Type of Break	**Cone & Shear**
Young's Modulus, psi	**3,400,000**
Poisson's Ratio	**0.41**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-908 79.35'
Stress (psi)
10000.0
9000.0
8000.0
7000.0
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
0.000 0000
0.001 0000
0.002 0000
0.003 0000
0.004 0000
0.005 0000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 3.40E+06x - 4.76E+03
Linear (Stress vs. Lateral Strain)
y = 8.30E+06x + 2.41E+03

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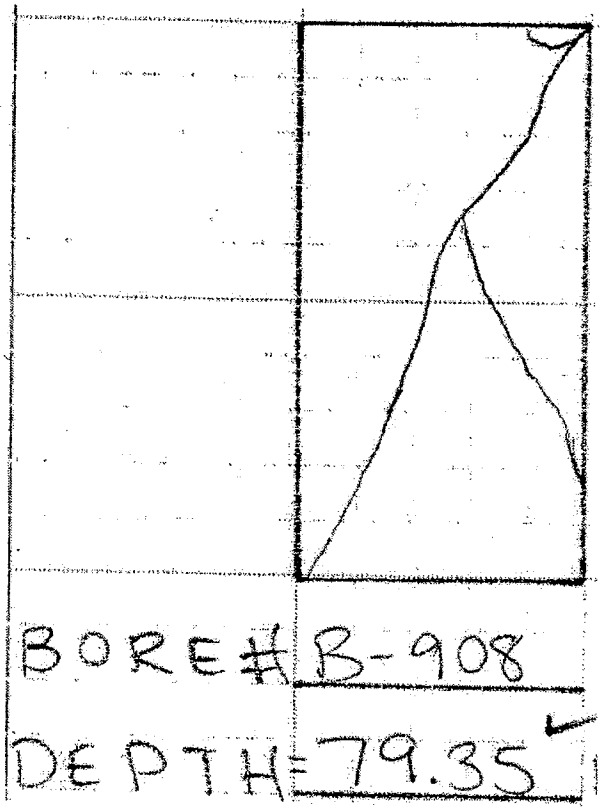
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**908**		
Sample Depth (ft):	**79.35**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/13/2006**	**Review Date:**	**12/12/2006**



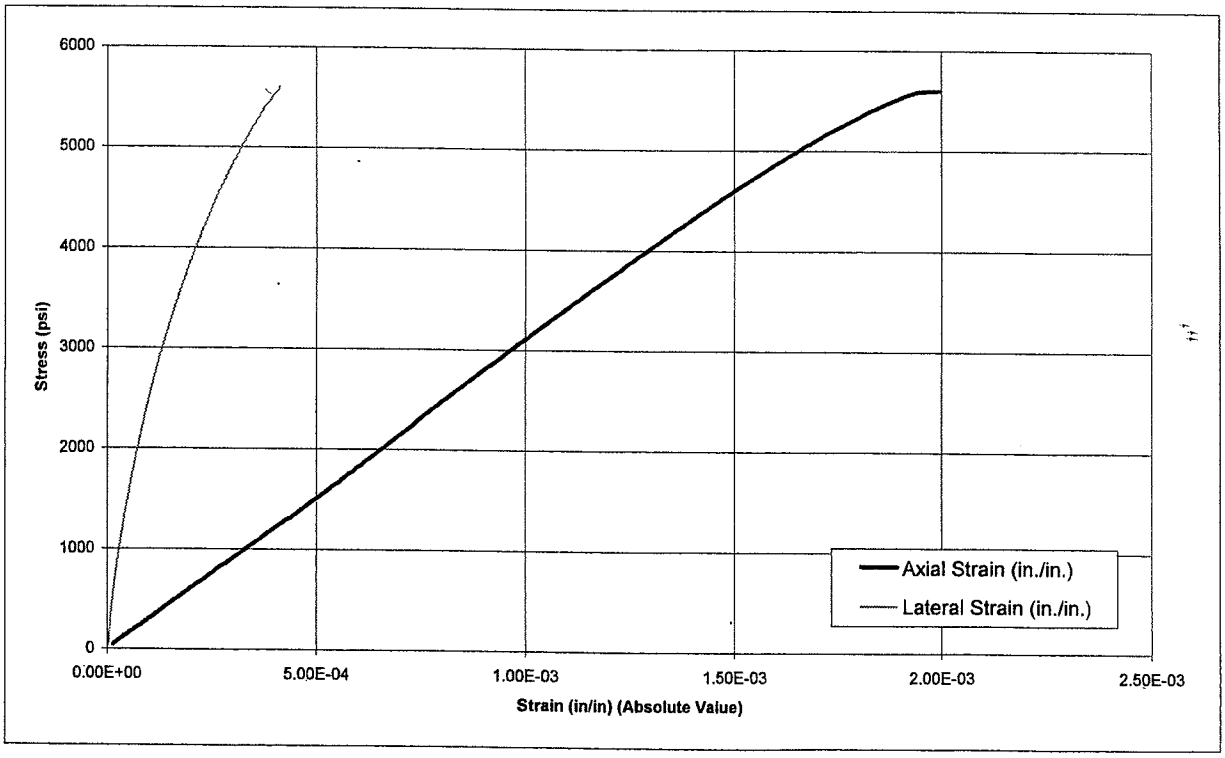
MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

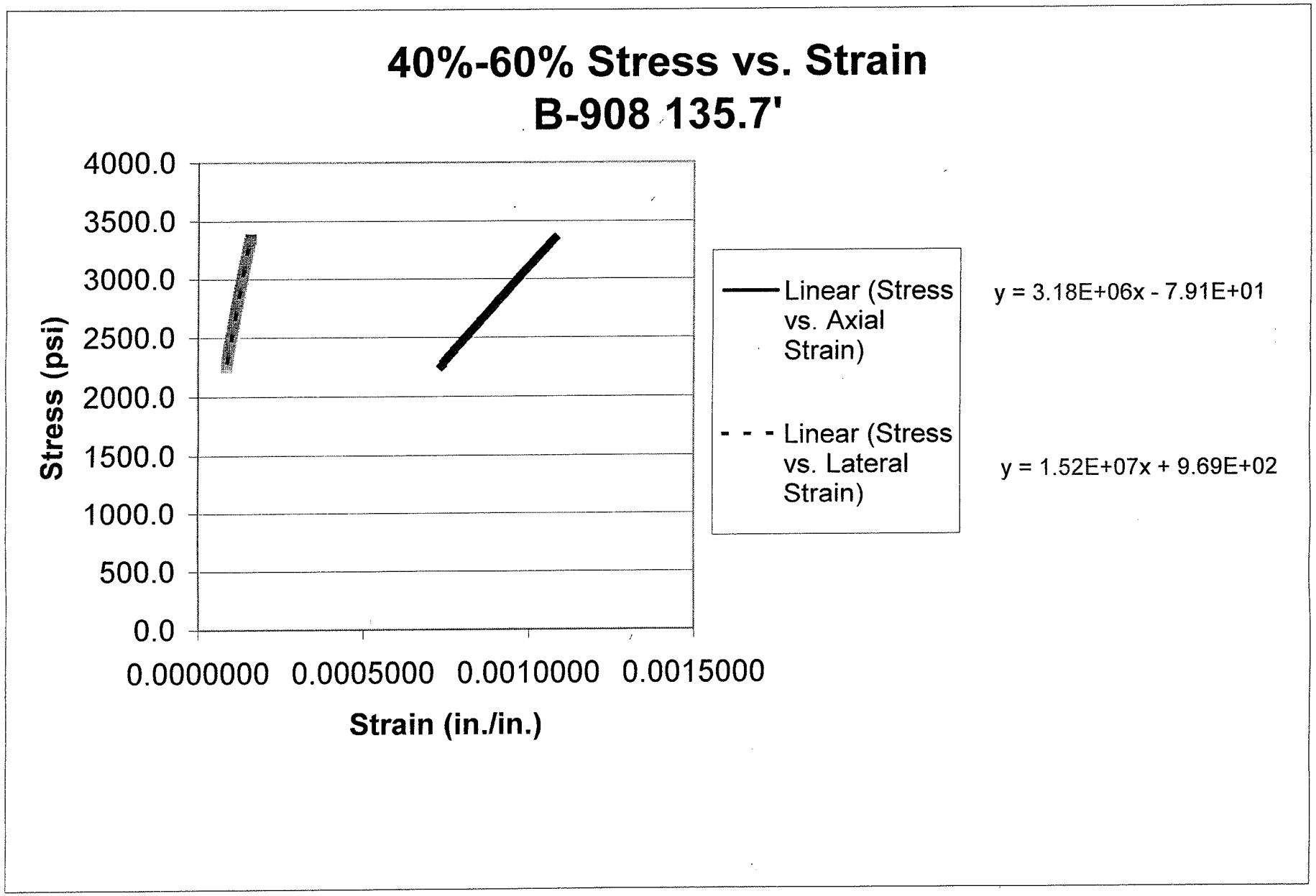
ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**908**		
Sample Depth (ft):	**135.7**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/13/2006**	**Review Date:**	1-19-07

Rock Type	**Quartz-Biotite Gneiss**
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.377**
Specimen Length, inch	**5.282**
Length/Diameter Ratio	**2.22**
Unit Weight (lbs/ft^3)	**187**
Test Duration (Time to Failure in Minutes)	**5.2**
Unconfined Compressive Strength, psi (from test)	**5,602**
Unconfined Compressive Strength, psi (with L/D correction)	**5,670**
Type of Break	**Shear**
Young's Modulus, psi	**3,180,000**
Poisson's Ratio	**0.21**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

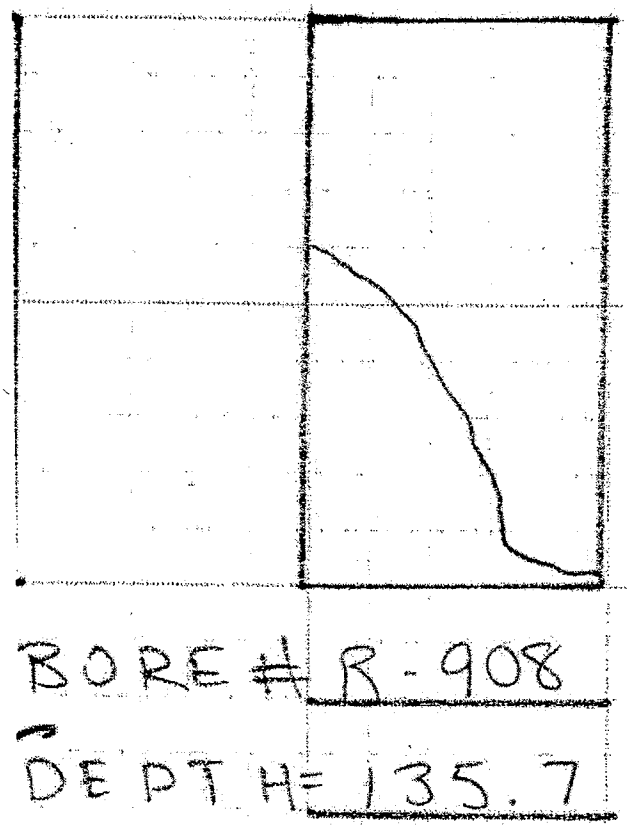

40%-60% Stress vs. Strain
B-908 135.7'
Stress (psi)
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000000
0.0005000
0.0010000
0.0015000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 3.18E+06x - 7.91E+01
y = 1.52E+07x + 9.69E+02

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**908**		
Sample Depth (ft):	**135.7**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/13/2006**	**Review Date:**	**12/12/2006**



MACTEC

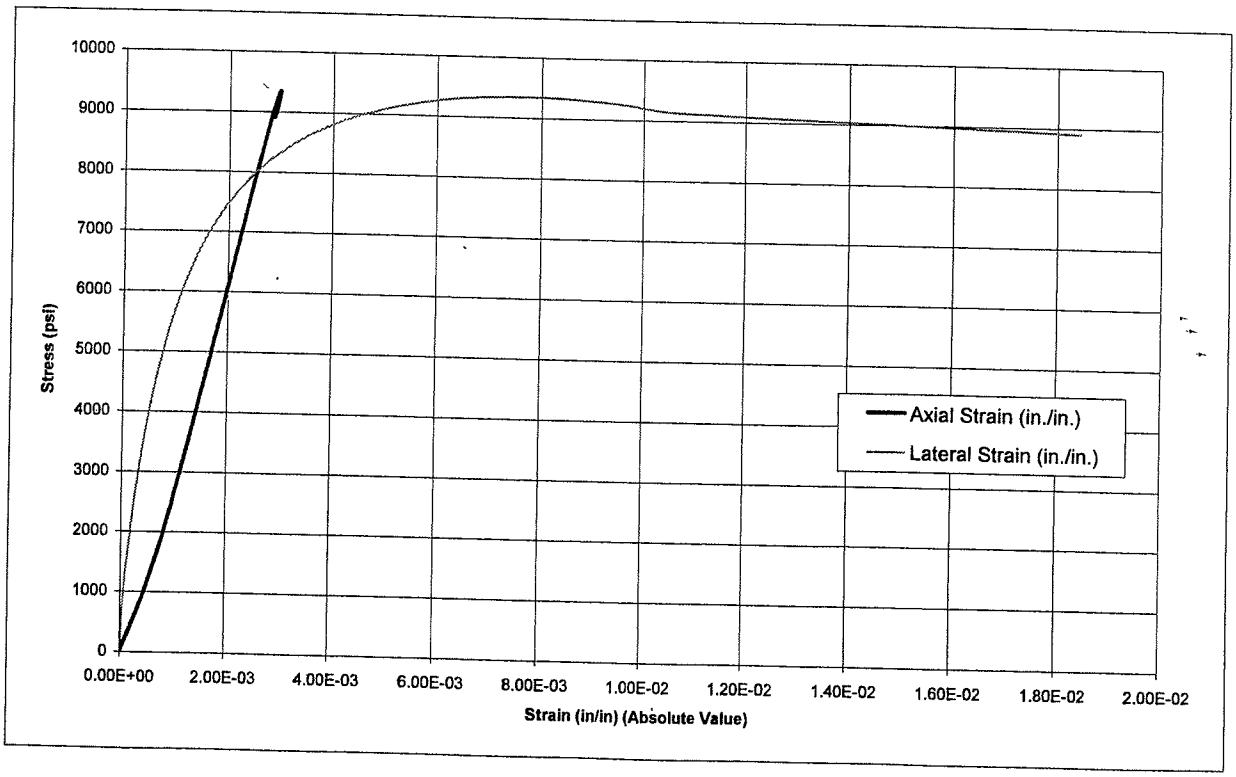
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	North Anna
Project Number:	6468061472
Boring Number:	909
Sample Depth (ft):	82.35
Tested By:	Jacob B. Mock
Test Date:	12/1/2006

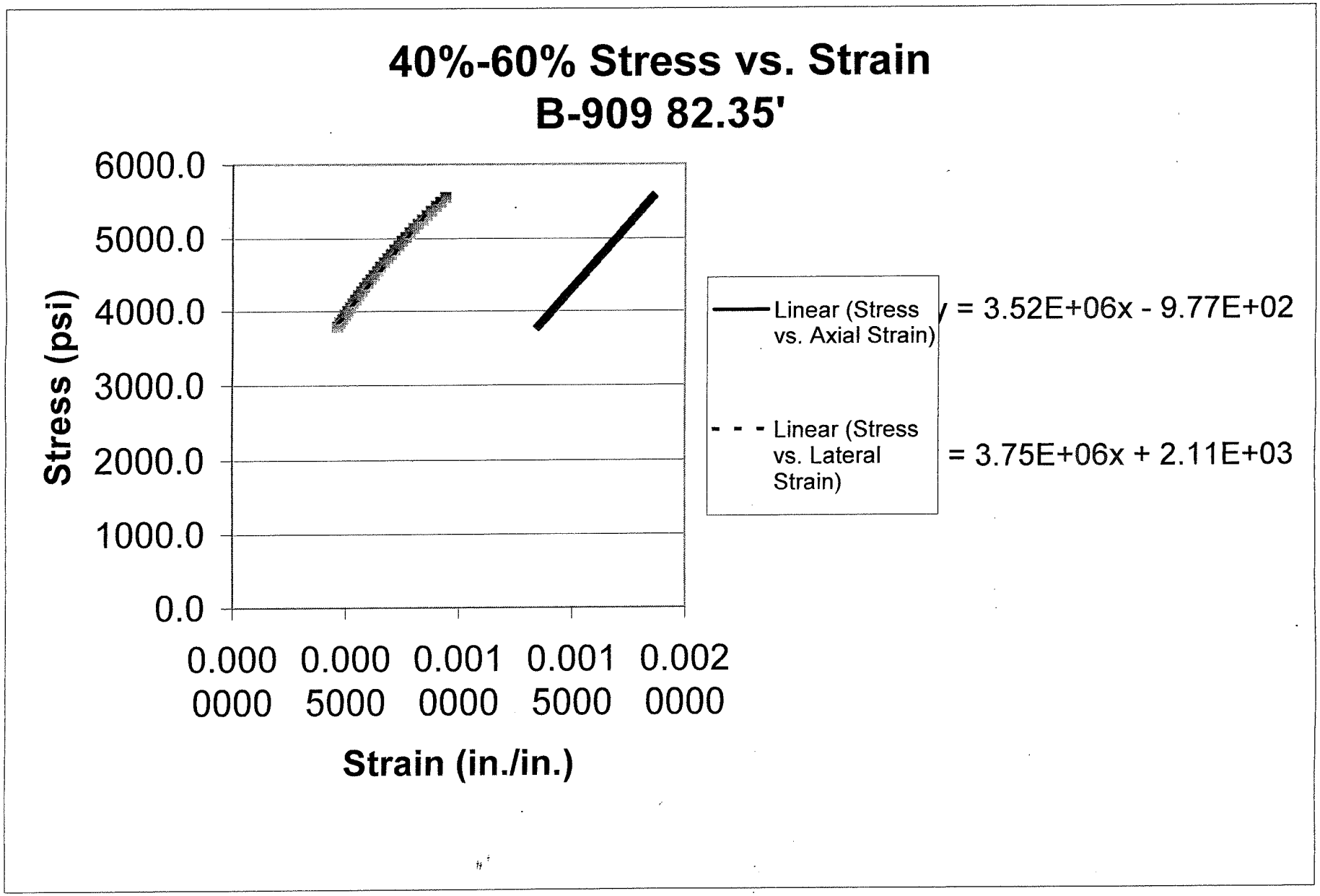
Reviewed By: DSC
Review Date: 1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.391
Specimen Length, inch	5.319
Length/Diameter Ratio	2.22
Unit Weight (lbs/ft^3)	176
Test Duration (Time to Failure in Minutes)	7.7
Unconfined Compressive Strength, psi (from test)	9,349
Unconfined Compressive Strength, psi (with L/D correction)	9,464
Type of Break	Cone & Shear
Young's Modulus, psi	3,520,000
Poisson's Ratio	*



Comments: Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

* = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

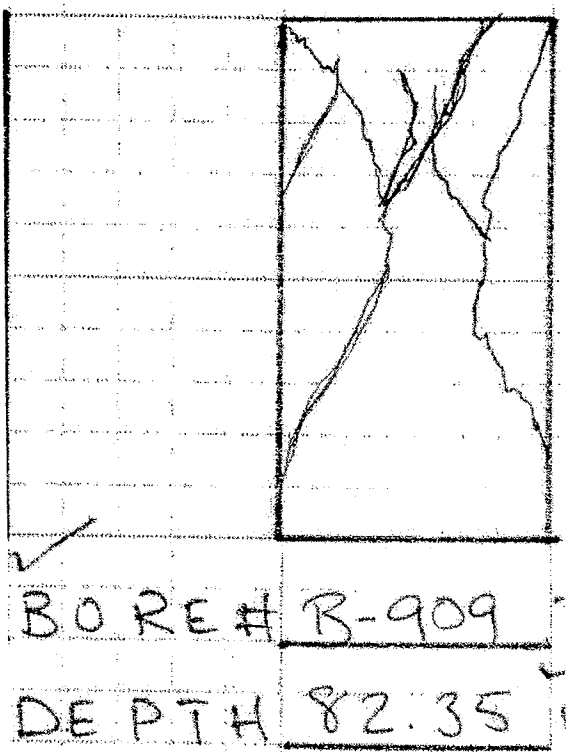

40%-60% Stress vs. Strain
B-909 82.35'
Stress (psi)
6000.0
5000.0
4000.0
3000.0
2000.0
1000.0
0.0
0.000 0000
0.000 5000
0.001 0000
0.001 5000
0.002 0000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 3.52E+06x - 9.77E+02
Linear (Stress vs. Lateral Strain)
= 3.75E+06x + 2.11E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**909**		
Sample Depth (ft):	**82.35**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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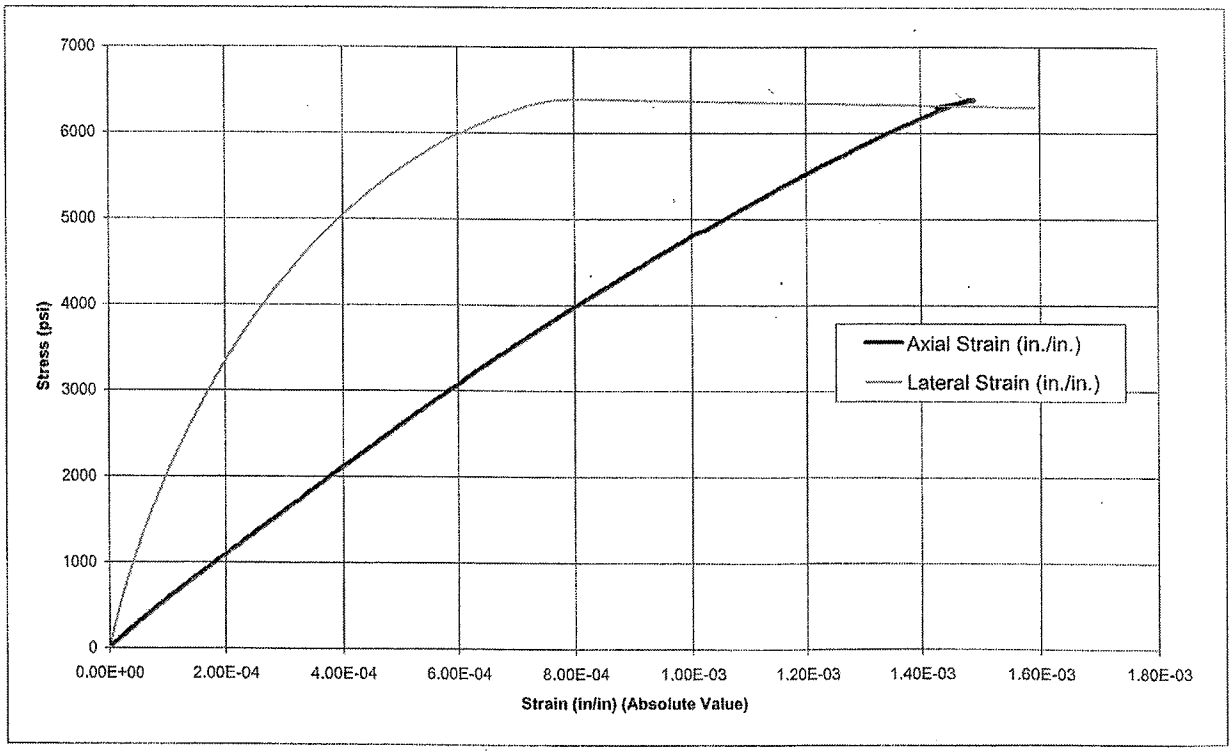
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

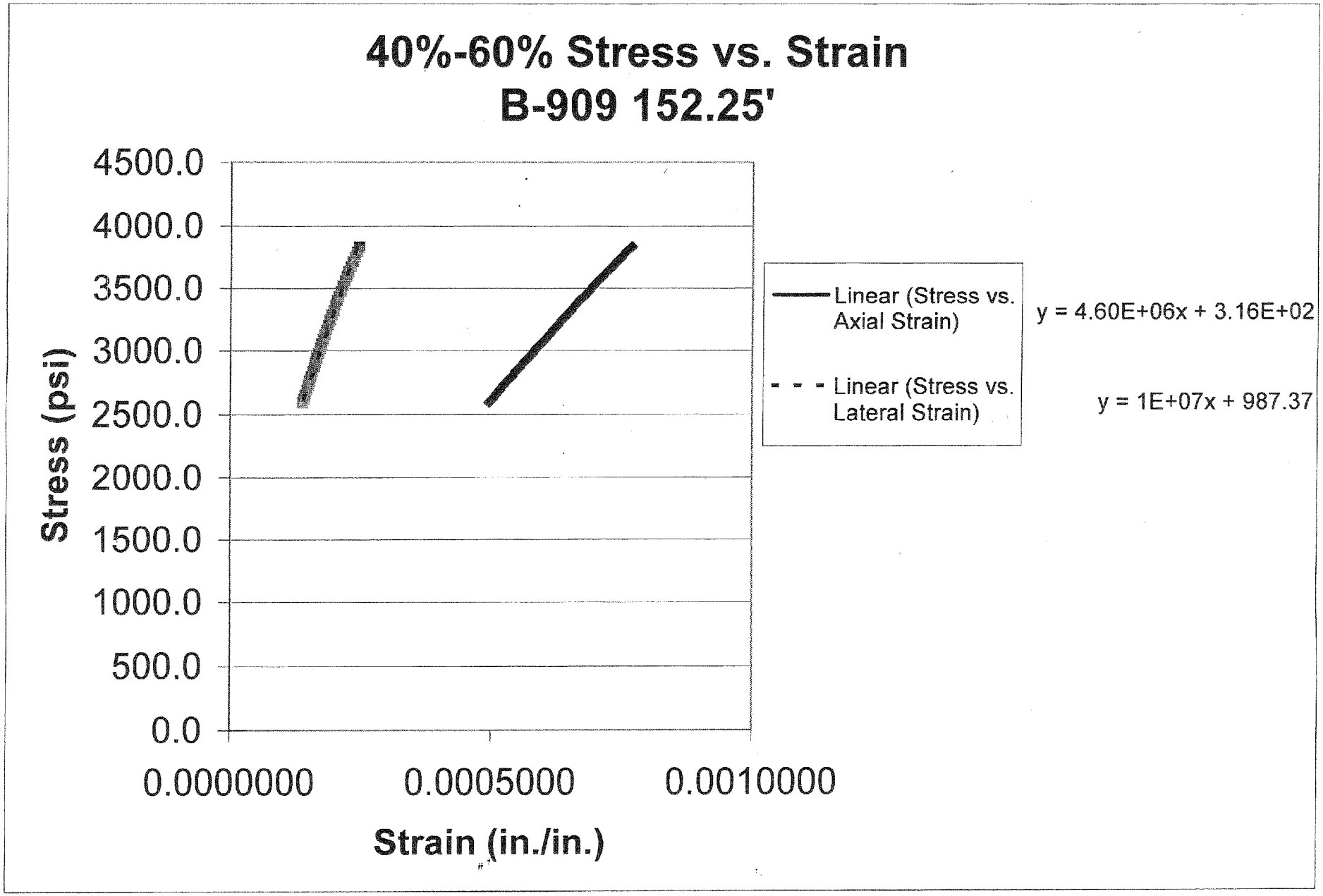
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**909**		
Sample Depth (ft):	**152.25**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/5/2006**	**Review Date:**	1-19-07

Rock Type	**Quartz-Biotite Gneiss**
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.383**
Specimen Length, inch	**5.274**
Length/Diameter Ratio	**2.21**
Unit Weight (lbs/ft^3)	**184**
Test Duration (Time to Failure in Minutes)	**5.5**
Unconfined Compressive Strength, psi (from test)	**6,392**
Unconfined Compressive Strength, psi (with L/D correction)	**6,467**
Type of Break	**Cone & Shear**
Young's Modulus, psi	**4,600,000**
Poisson's Ratio	**0.39**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

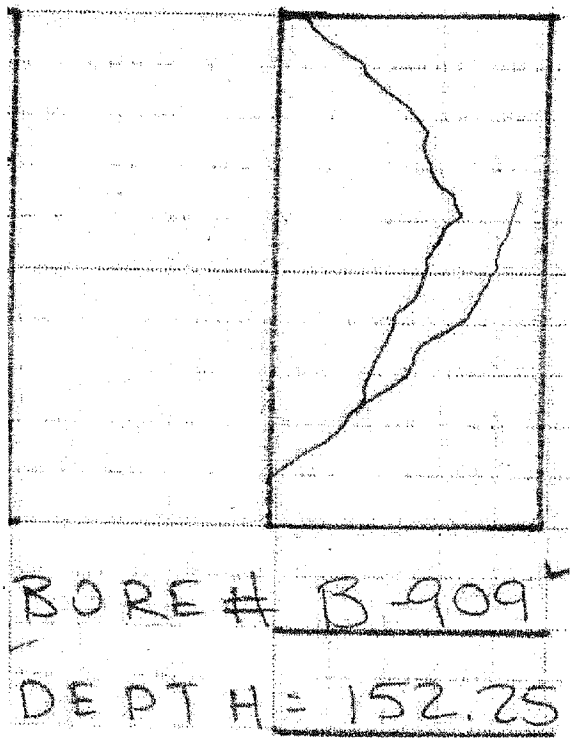

40%-60% Stress vs. Strain
B-909 152.25'
Stress (psi)
4500.0
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000000
0.0005000
0.0010000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 4.60E+06x + 3.16E+02
Linear (Stress vs. Lateral Strain)
y = 1E+07x + 987.37

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**909**		
Sample Depth (ft):	**152.25**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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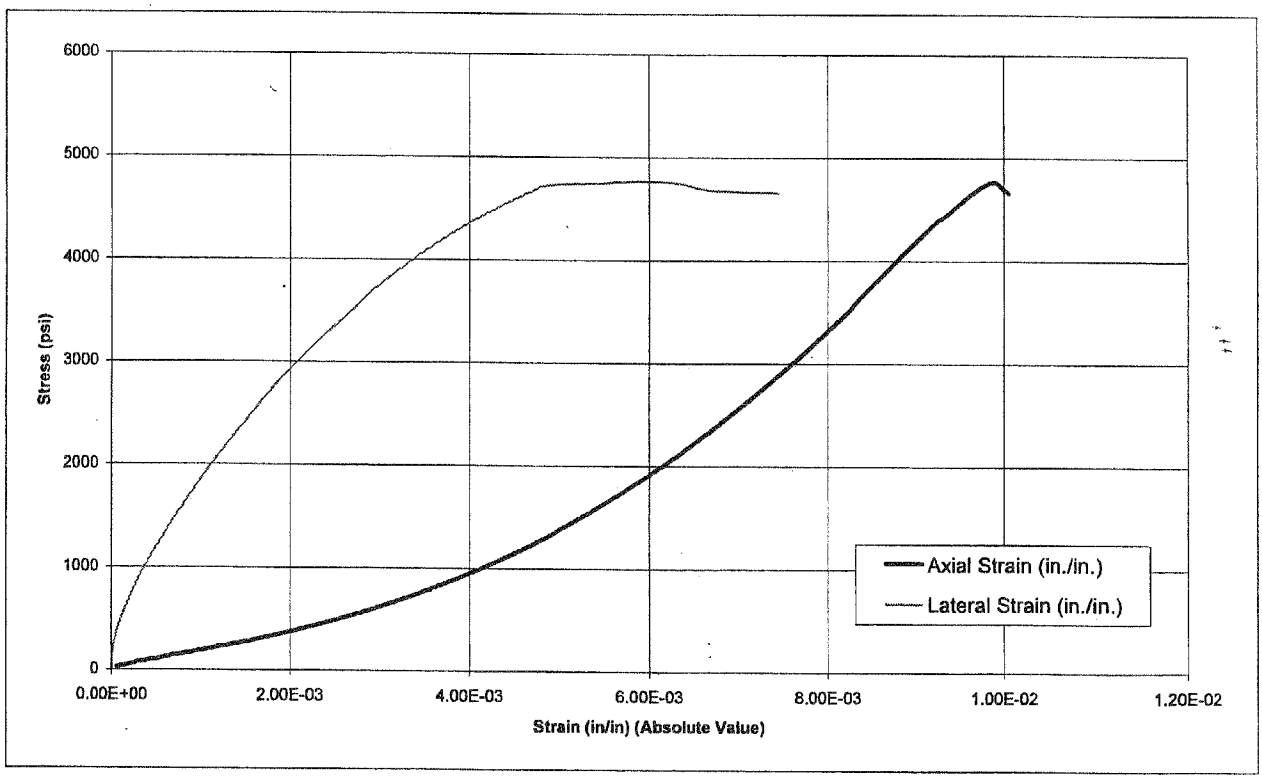
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name: North Anna
Project Number: 6468061472
Boring Number: 910
Sample Depth (ft): 91.1
Tested By: Jacob B. Mock
Test Date: 12/7/2006

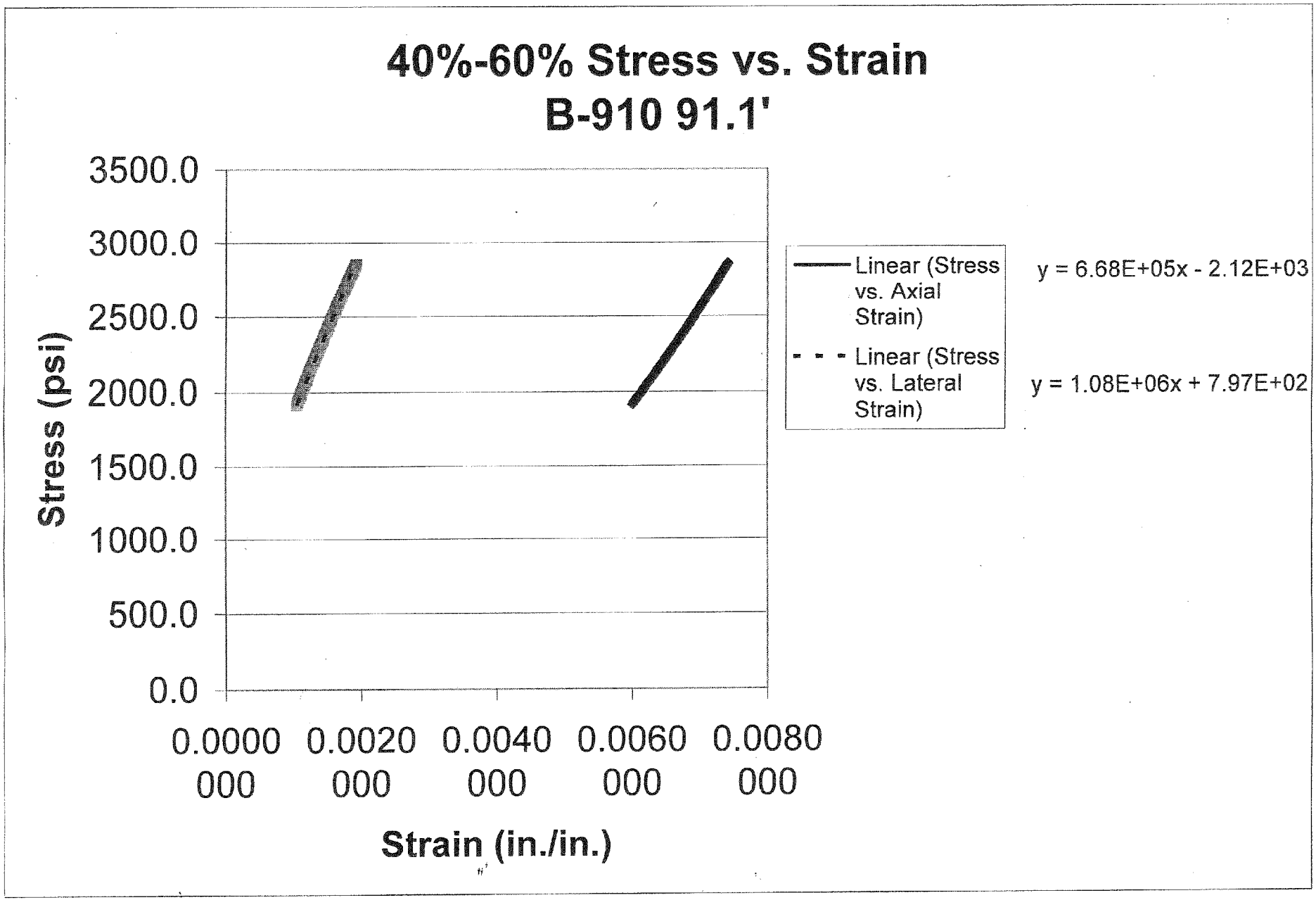
Reviewed By: DSC
Review Date: 1-22-07

Rock Type	Biotite Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.386
Specimen Length, inch	5.237
Length/Diameter Ratio	2.19
Unit Weight (lbs/ft^3)	159
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	4,769
Unconfined Compressive Strength, psi (with L/D correction)	4,821
Type of Break	Shear
Young's Modulus, psi	670,000
Poisson's Ratio	*



Comments: Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive. * = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

Sample had chips on end. Tested "as is" with approval by Bechtel.

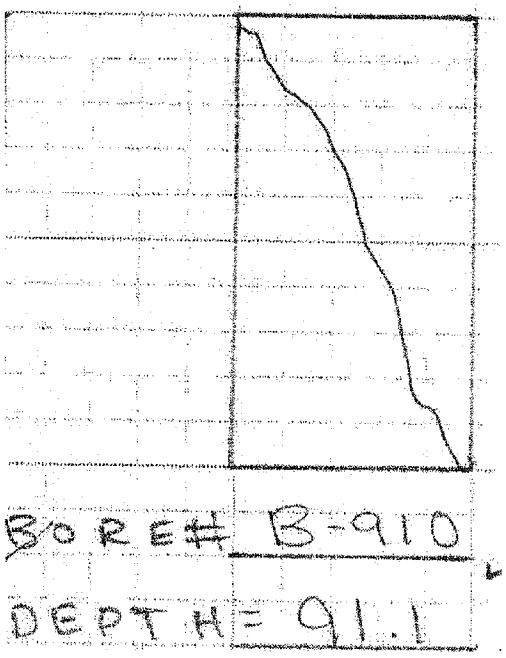

40%-60% Stress vs. Strain
B-910 91.1'
Stress (psi)
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000 000
0.0020 000
0.0040 000
0.0060 000
0.0080 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 6.68E+05x - 2.12E+03
y = 1.08E+06x + 7.97E+02

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**910**		
Sample Depth (ft):	**91.1**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/7/2006**	**Review Date:**	**12/12/2006**



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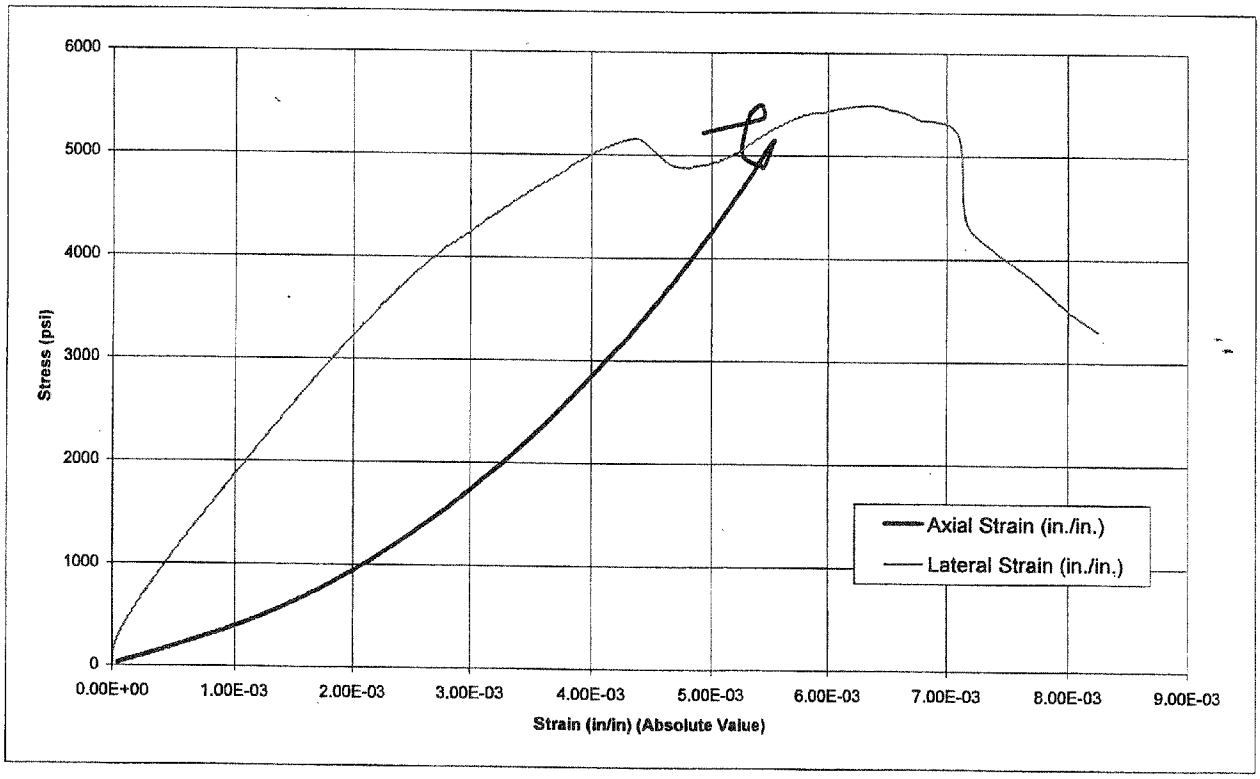
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

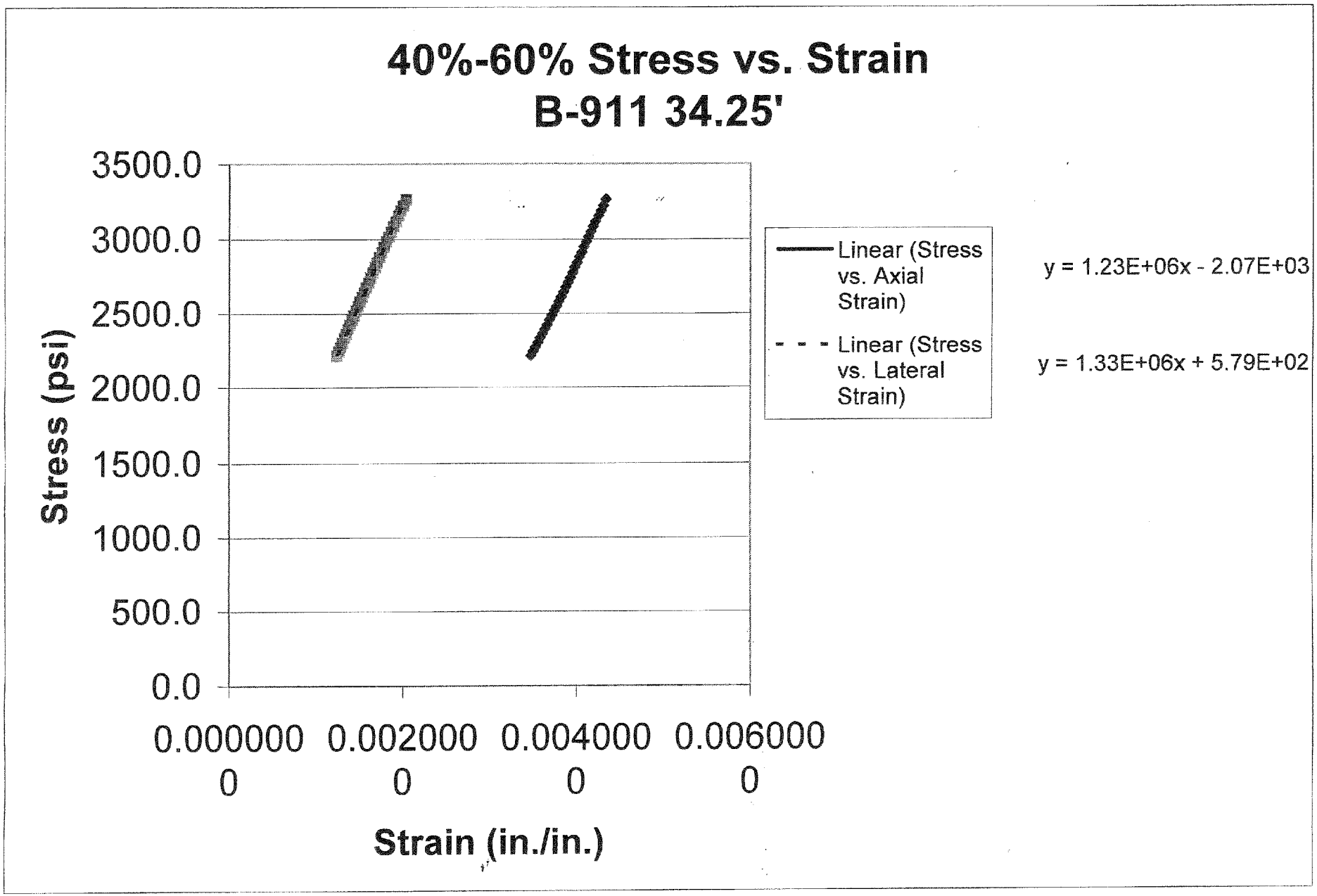
Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	911		
Sample Depth (ft):	34.25		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/1/2006	**Review Date:**	1-19-07

Rock Type	Quartz Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.371
Specimen Length, inch	5.275
Length/Diameter Ratio	2.22
Unit Weight (lbs/ft^3)	161
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	5,491
Unconfined Compressive Strength, psi (with L/D correction)	5,558
Type of Break	Shear
Young's Modulus, psi	1,230,000
Poisson's Ratio	*



Comments: Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

* = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

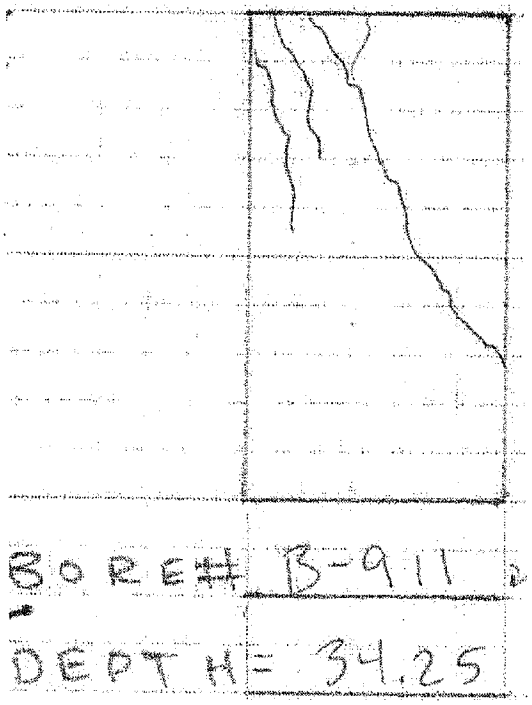

40%-60% Stress vs. Strain
B-911 34.25'
Stress (psi)
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.000000
0.002000
0.004000
0.006000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 1.23E+06x - 2.07E+03
y = 1.33E+06x + 5.79E+02

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**911**		
Sample Depth (ft):	**34.25**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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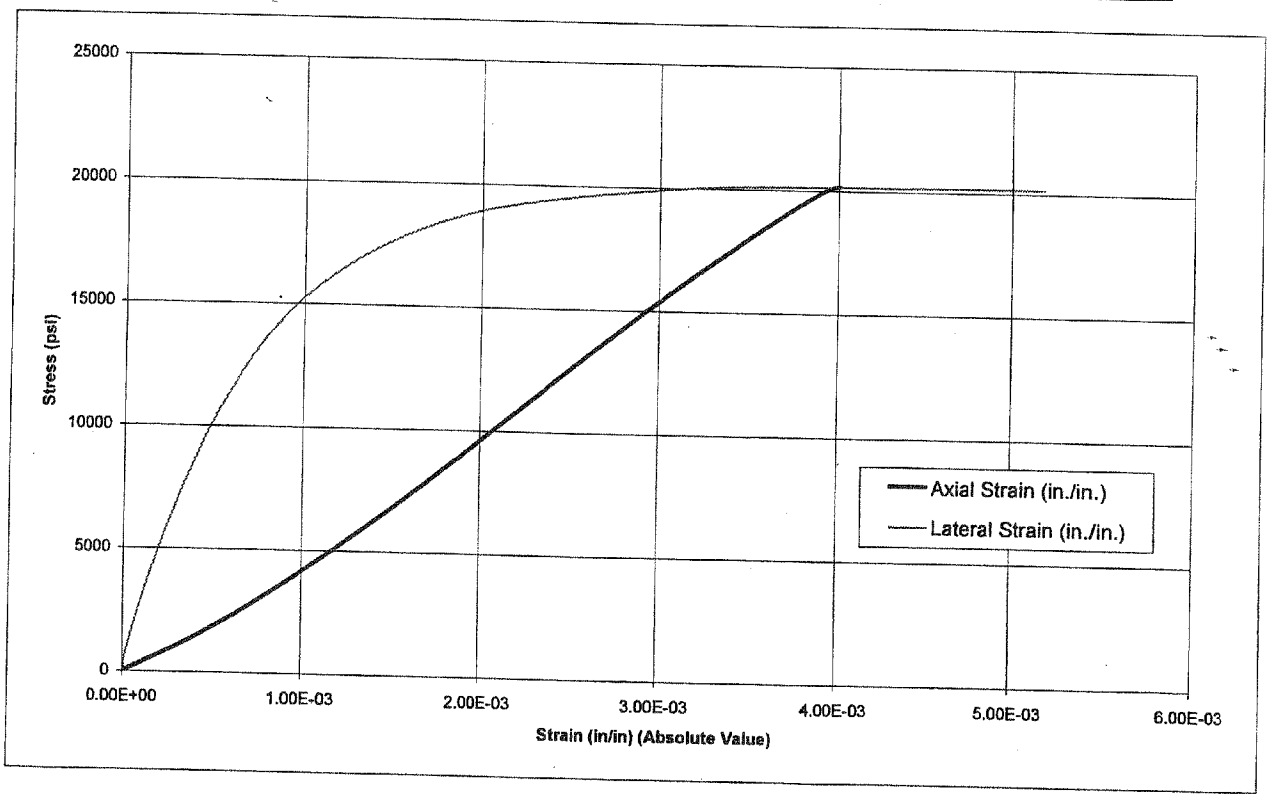
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

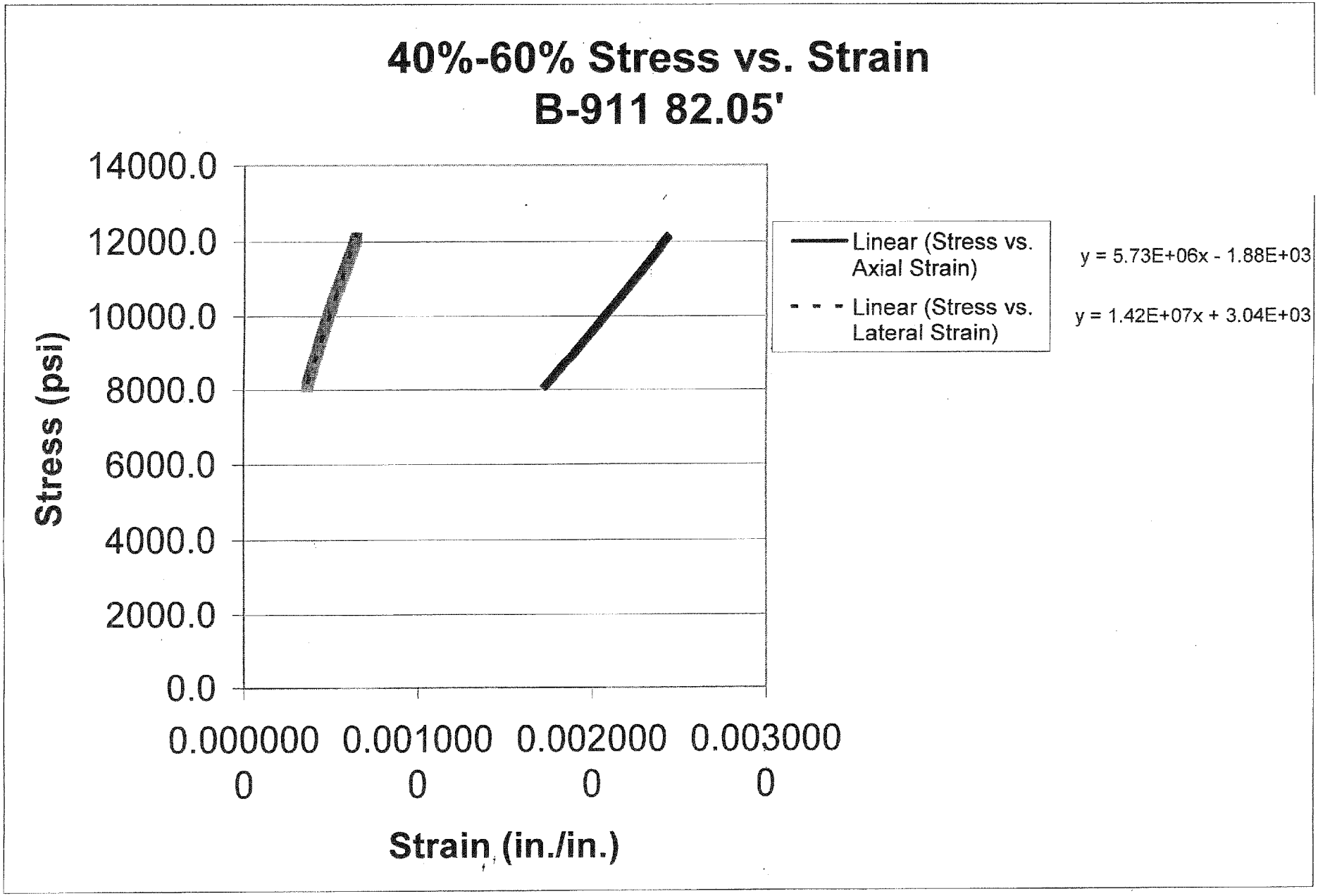
Project Name:	North Anna
Project Number:	6468061472
Boring Number:	911
Sample Depth (ft):	82.05
Tested By:	Jacob B. Mock
Test Date:	12/1/2006

Reviewed By: DSC
Review Date: 1-19-07

Rock Type	Quartz Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.397
Specimen Length, inch	5.361
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	164
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	20,172
Unconfined Compressive Strength, psi (with L/D correction)	20,431
Type of Break	Cone & Shear
Young's Modulus, psi	5,730,000
Poisson's Ratio	0.40



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

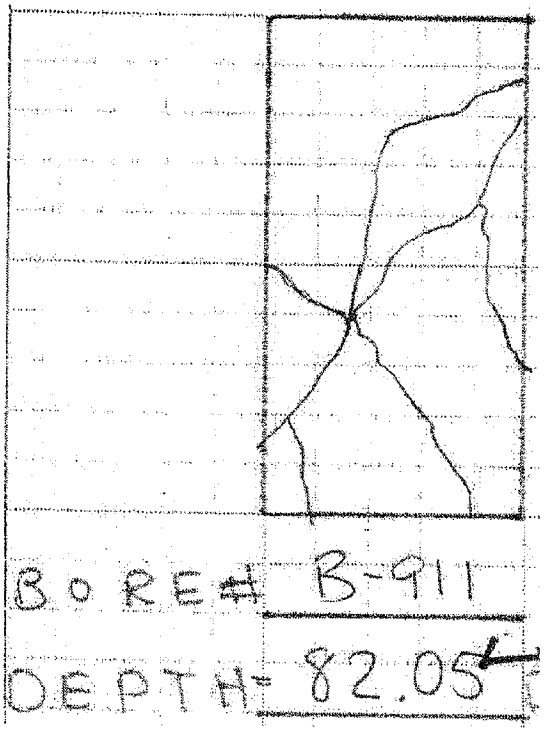

40%-60% Stress vs. Strain
B-911 82.05'
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.000000
0.001000
0.002000
0.003000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 5.73E+06x - 1.88E+03
y = 1.42E+07x + 3.04E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**911**		
Sample Depth (ft):	**82.05**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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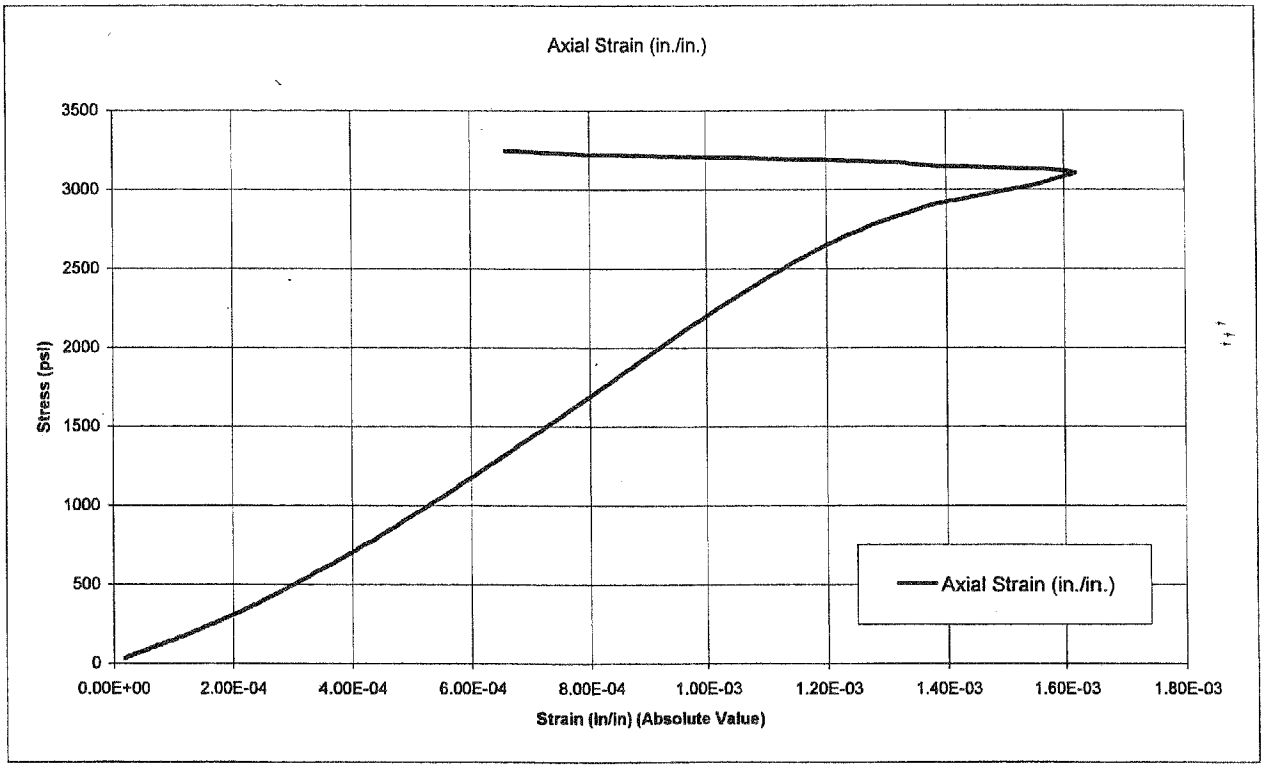
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

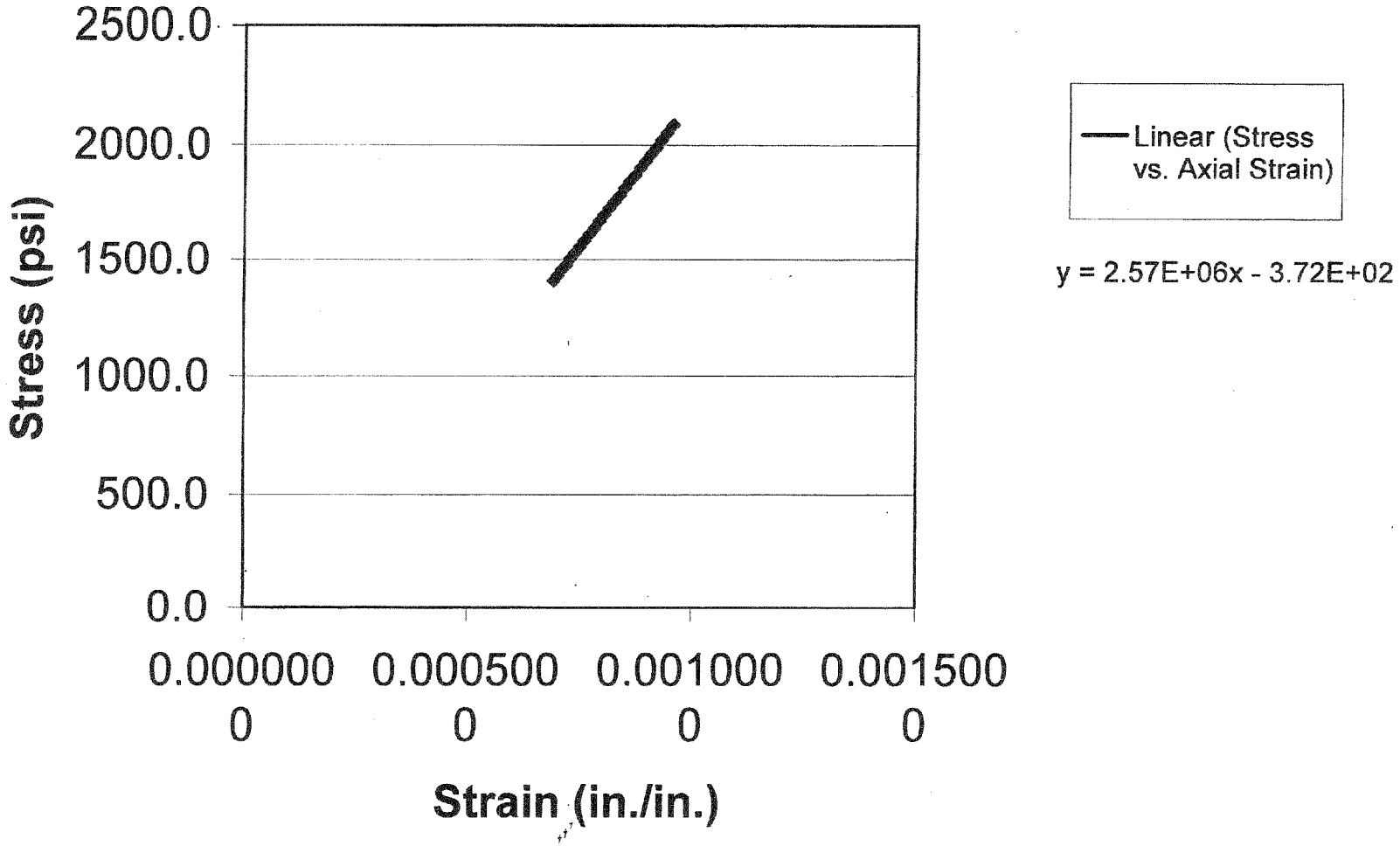
Project Name:	North Anna COL		
Project Number:	6468061472		
Boring Number:	912		
Sample Depth (ft):	37.1		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/13/2006	**Review Date:**	1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.390
Specimen Length, inch	5.317
Length/Diameter Ratio	2.22
Unit Weight (lbs/ft^3)	170
Test Duration (Time to Failure in Minutes)	5.7
Unconfined Compressive Strength, psi (from test)	3,482
Unconfined Compressive Strength, psi (with L/D correction)	3,524
Type of Break	Cone & Shear
Young's Modulus, psi	2,570,000
Poisson's Ratio	N/A



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative.
Poisson's Ratio is not given due to lateral strain gage failure during testing.

40%-60% Stress vs. Strain
B-912 37.1'



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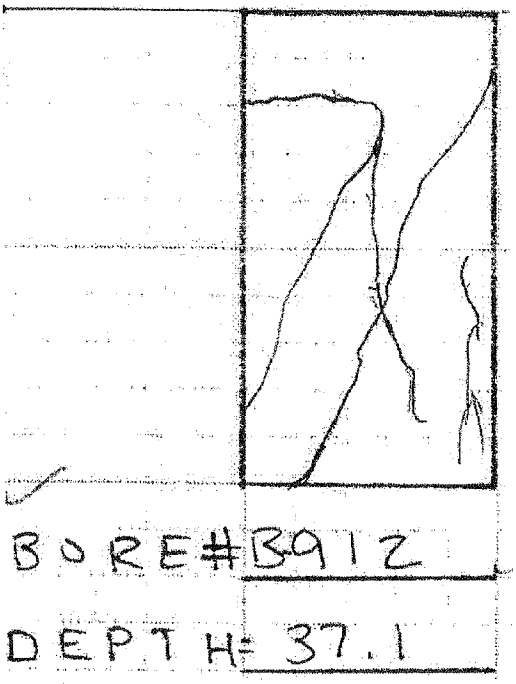
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**912**		
Sample Depth (ft):	**37.1**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/13/2006**	**Review Date:**	1-19-07



MACTEC

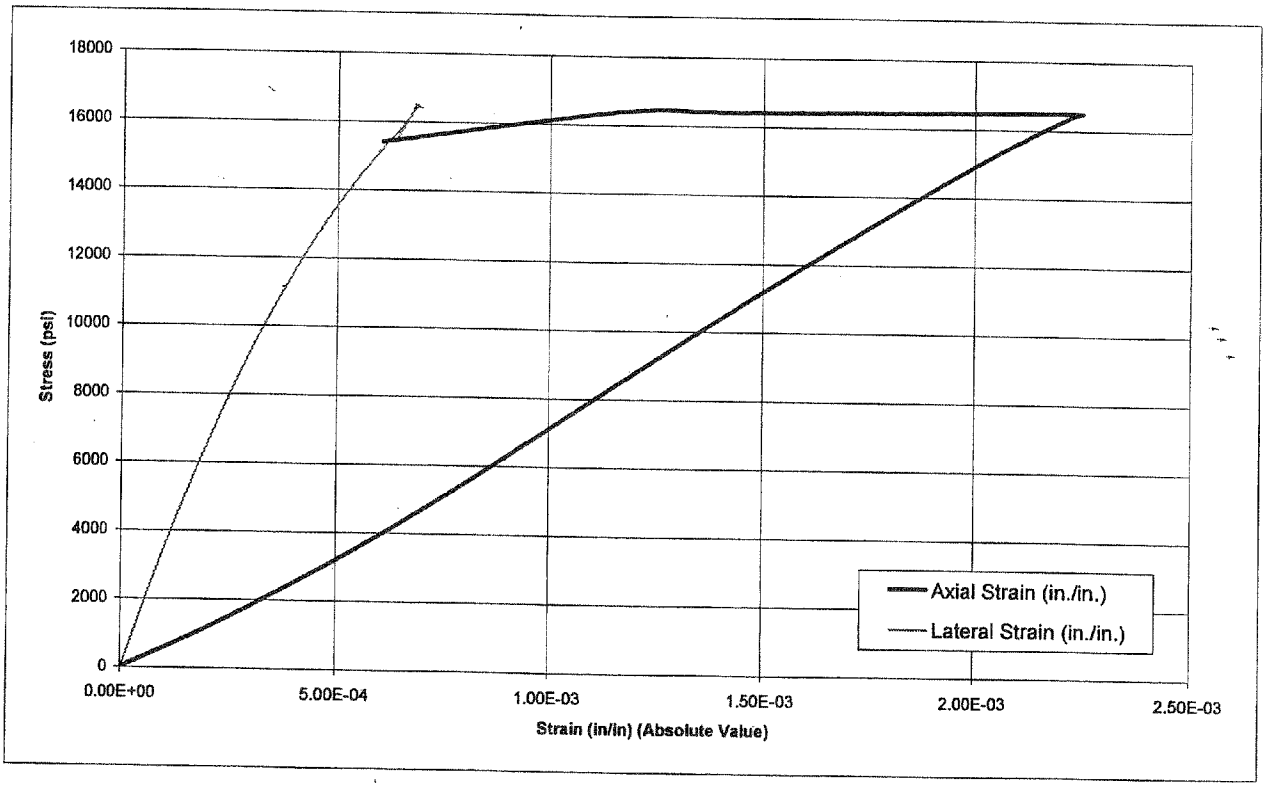
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

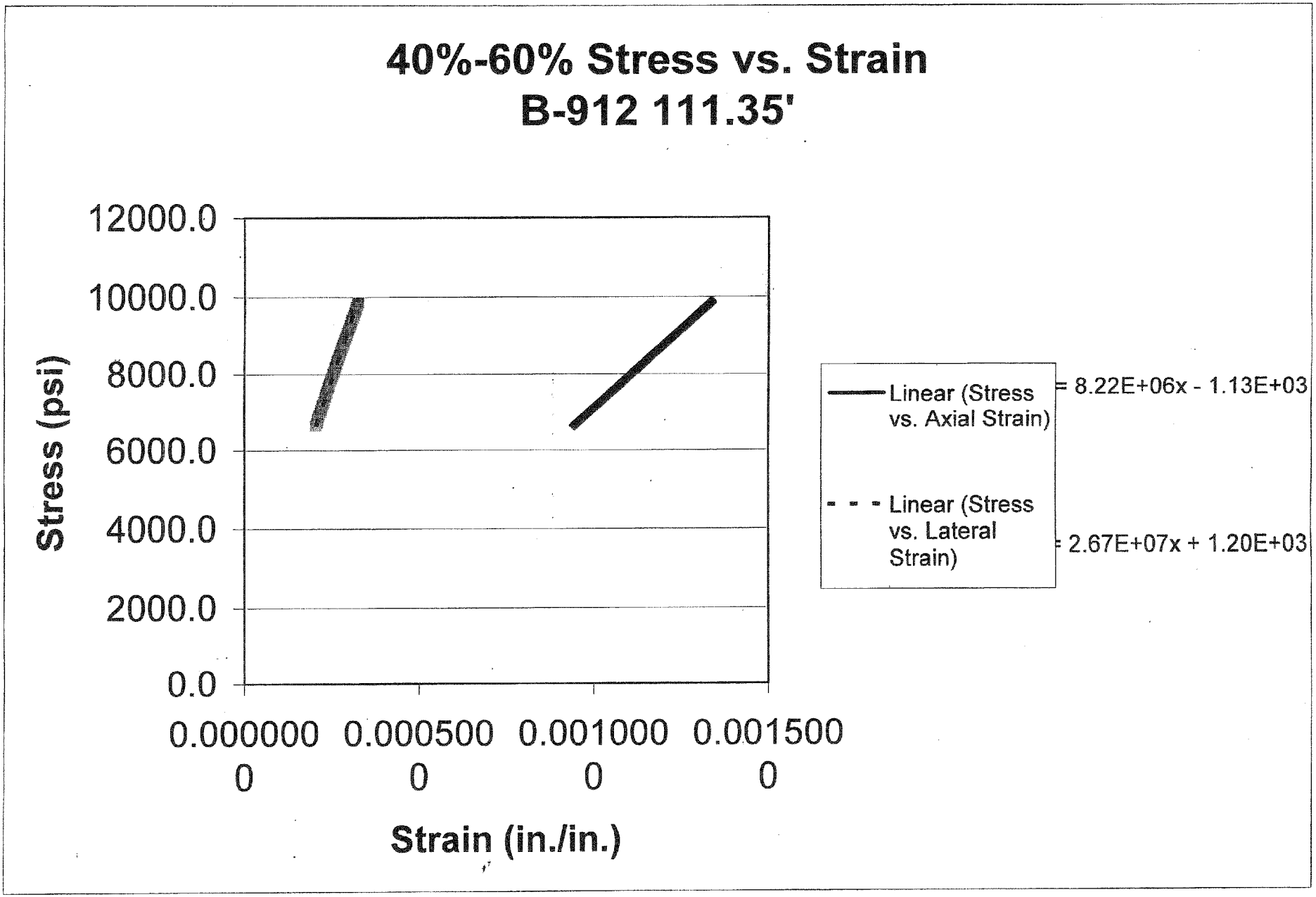
Project Name:	North Anna COL
Project Number:	6468061472
Boring Number:	912
Sample Depth (ft):	111.35
Tested By:	Jacob B. Mock
Test Date:	12/13/2006

Reviewed By: DSC
Review Date: 1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.402
Specimen Length, inch	5.315
Length/Diameter Ratio	2.21
Unit Weight (lbs/ft^3)	163
Test Duration (Time to Failure in Minutes)	7.3
Unconfined Compressive Strength, psi (from test)	16,509
Unconfined Compressive Strength, psi (with L/D correction)	16,702
Type of Break	Shear
Young's Modulus, psi	8,220,000
Poisson's Ratio	0.31



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

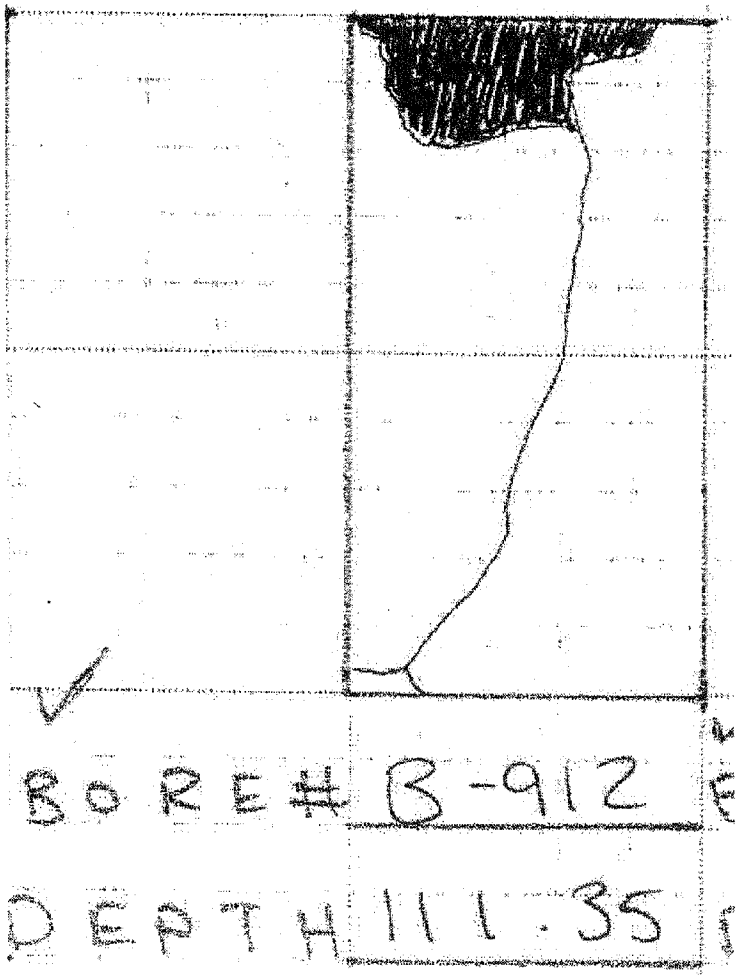

40%-60% Stress vs. Strain
B-912 111.35'
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.000000
0.000500
0.001000
0.001500
Strain (in./in.)
Linear (Stress vs. Axial Strain)
= 8.22E+06x - 1.13E+03
Linear (Stress vs. Lateral Strain)
= 2.67E+07x + 1.20E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**912**		
Sample Depth (ft):	**111.35**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/13/2006**	**Review Date:**	1-19-07



MACTEC

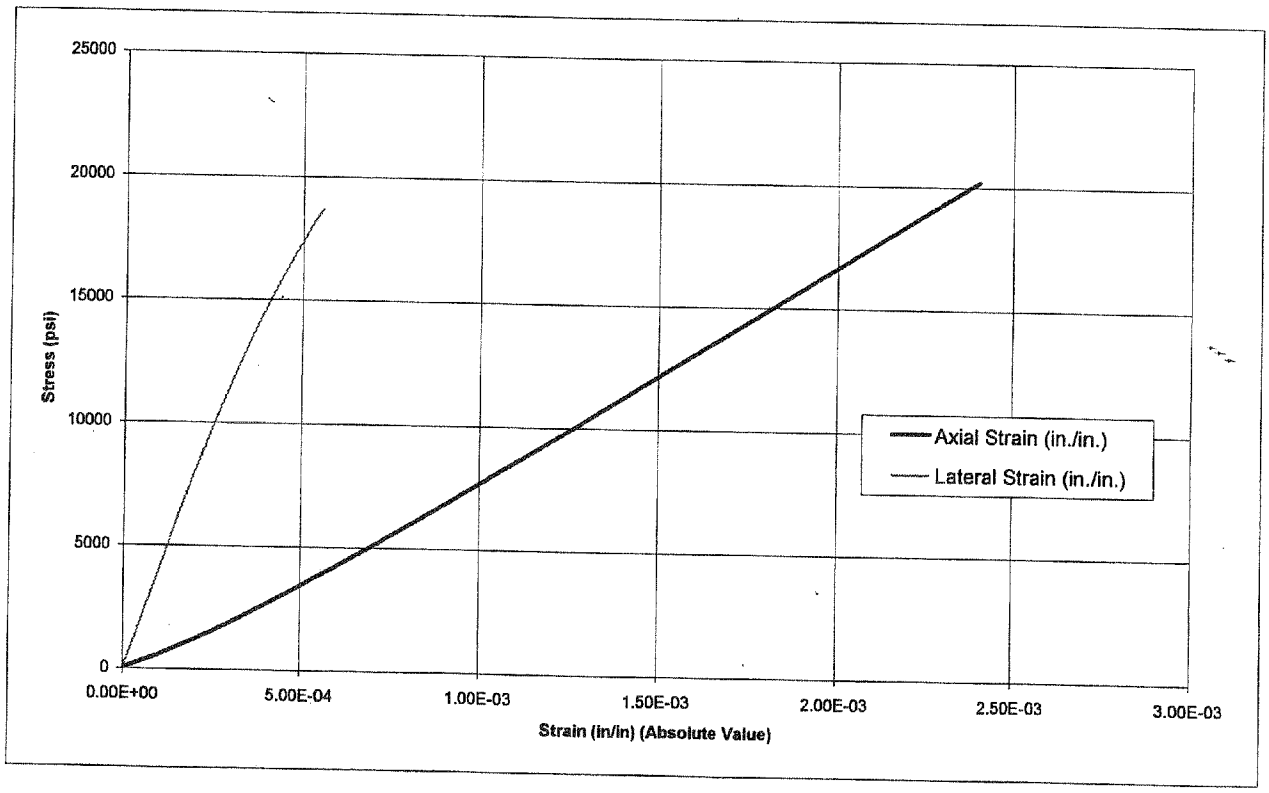
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

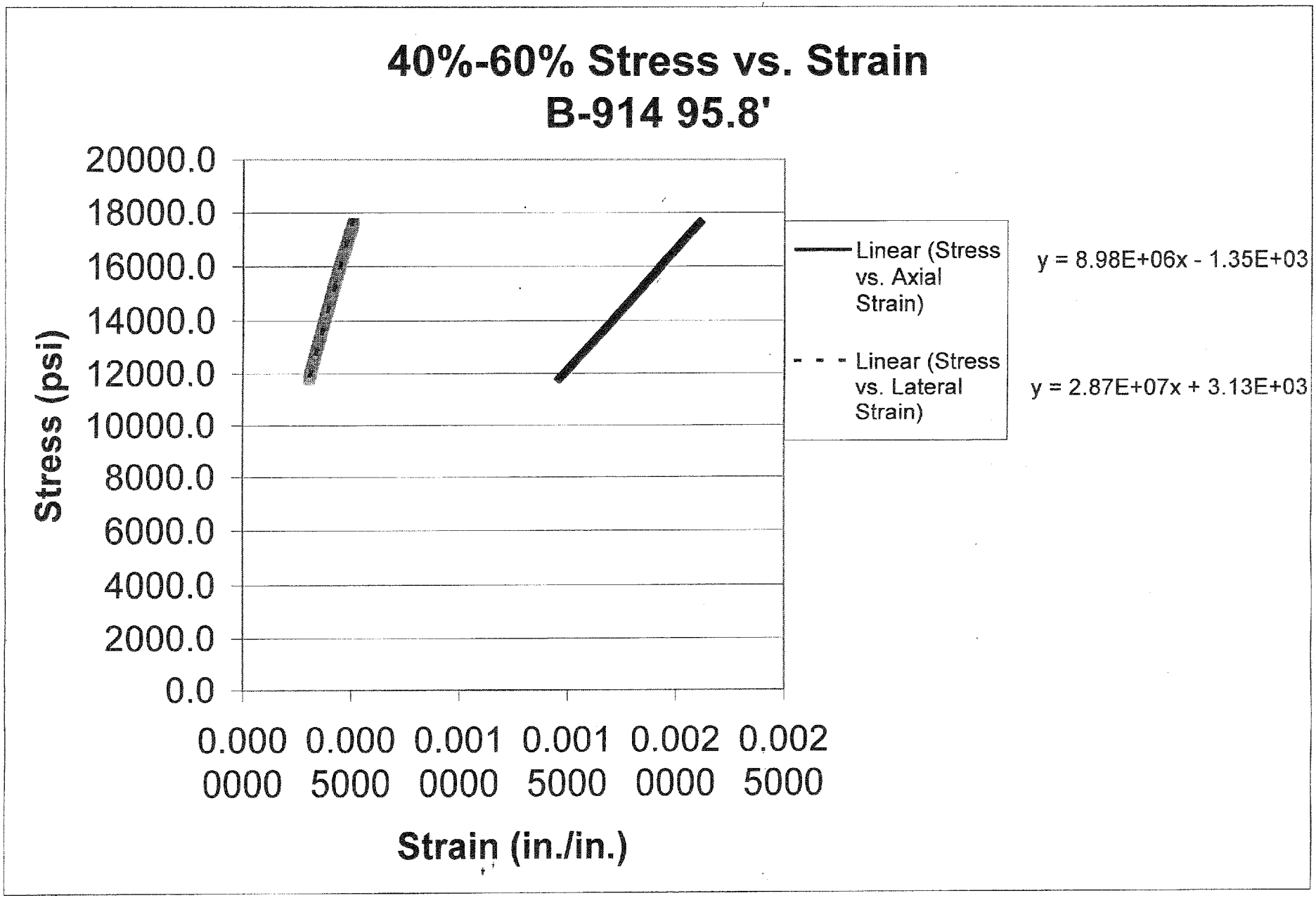
Project Name:	North Anna
Project Number:	6468061472
Boring Number:	914
Sample Depth (ft):	95.8
Tested By:	Jacob B. Mock
Test Date:	12/1/2006

Reviewed By: DSC
Review Date: 1-19-07

Rock Type	Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.400
Specimen Length, inch	5.368
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	164
Test Duration (Time to Failure in Minutes)	8.9
Unconfined Compressive Strength, psi (from test)	29,398
Unconfined Compressive Strength, psi (with L/D correction)	29,776
Type of Break	Cone & Shear
Young's Modulus, psi	8,980,000
Poisson's Ratio	0.31



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

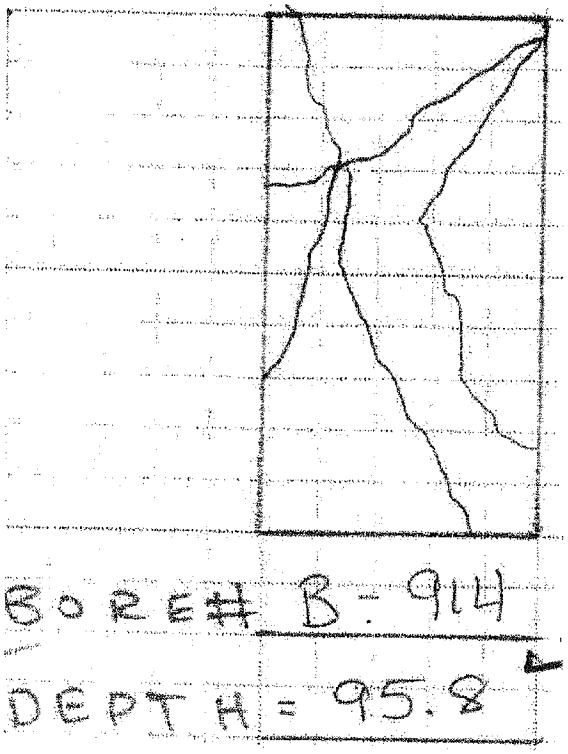

40%-60% Stress vs. Strain
B-914 95.8'
Stress (psi)
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.000 0000
0.000 5000
0.001 0000
0.001 5000
0.002 0000
0.002 5000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 8.98E+06x - 1.35E+03
Linear (Stress vs. Lateral Strain)
y = 2.87E+07x + 3.13E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**914**		
Sample Depth (ft):	**95.8**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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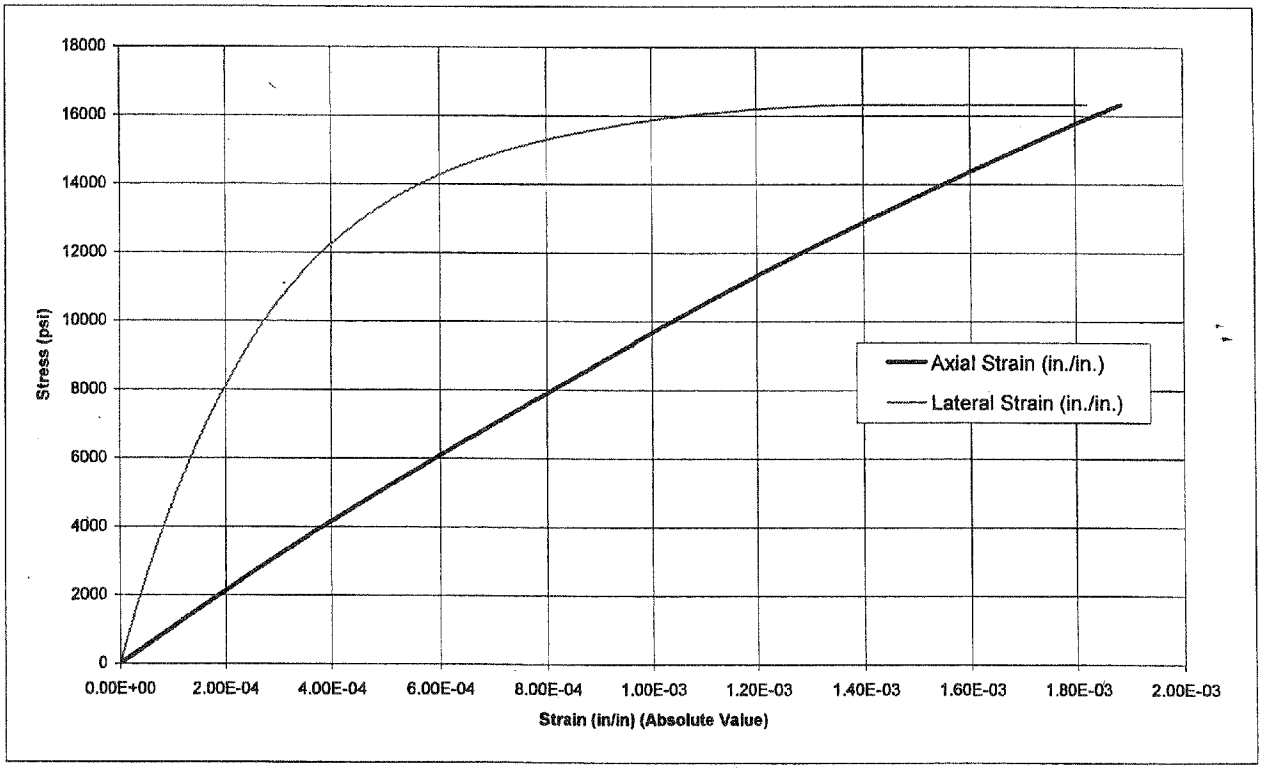
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

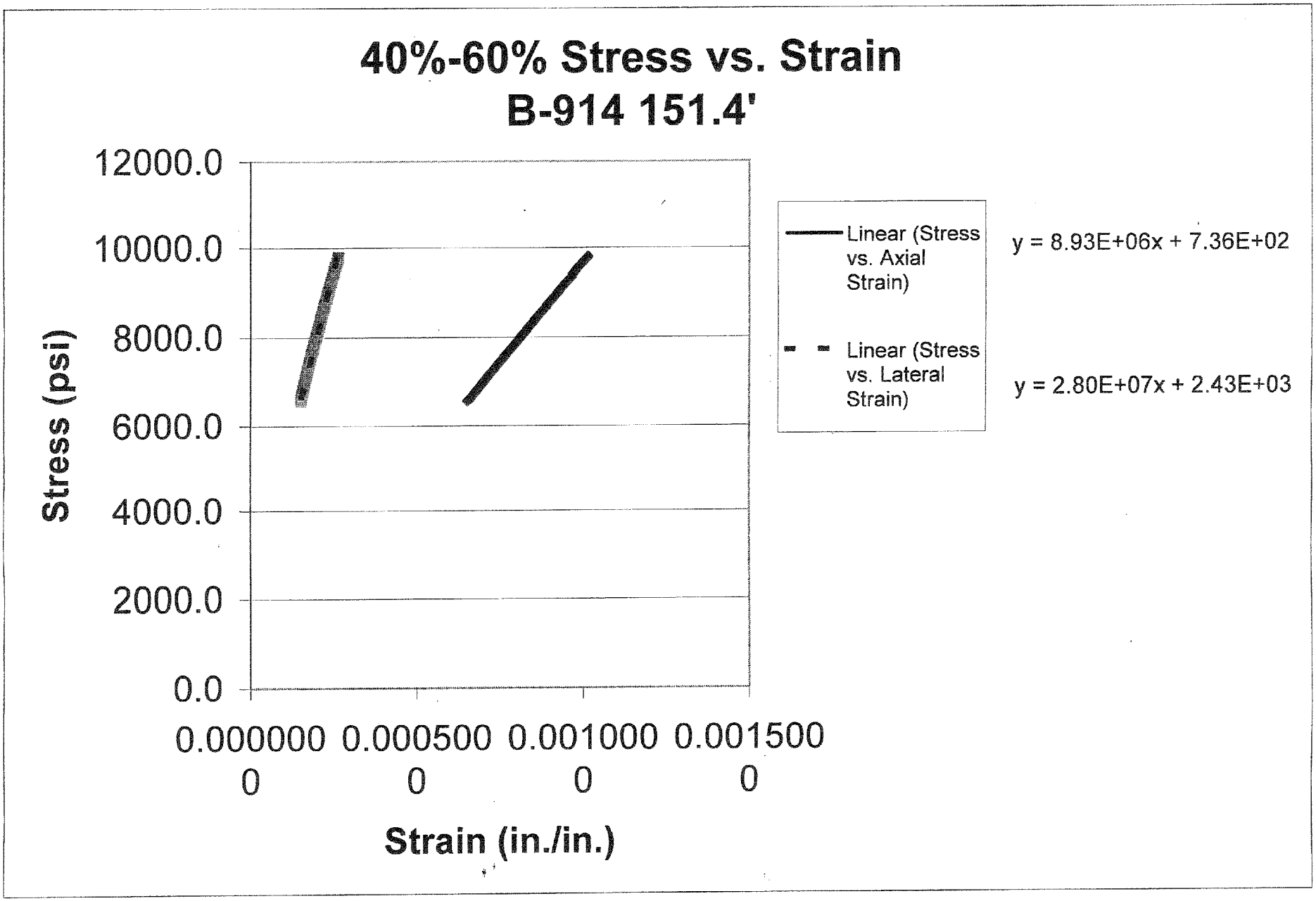
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**914**		
Sample Depth (ft):	**151.4**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DJC
Test Date:	**12/5/2006**	**Review Date:**	1-19-07

Rock Type	Biotite Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.396**
Specimen Length, inch	**5.312**
Length/Diameter Ratio	**2.22**
Unit Weight (lbs/ft^3)	**166**
Test Duration (Time to Failure in Minutes)	**8.7**
Unconfined Compressive Strength, psi (from test)	**16,324**
Unconfined Compressive Strength, psi (with L/D correction)	**16,517**
Type of Break	**Cone & Shear**
Young's Modulus, psi	**8,930,000**
Poisson's Ratio	**0.32**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

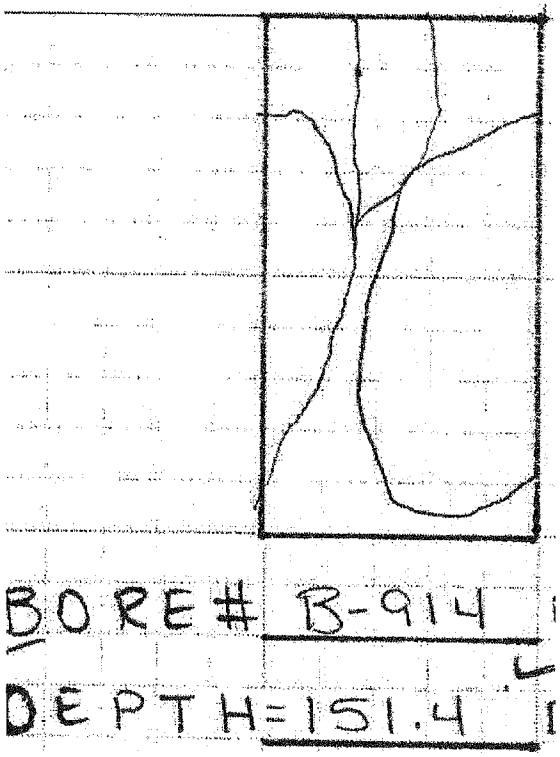

40%-60% Stress vs. Strain
B-914 151.4'
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.000000
0.000500
0.001000
0.001500
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 8.93E+06x + 7.36E+02
y = 2.80E+07x + 2.43E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**914**		
Sample Depth (ft):	**151.4**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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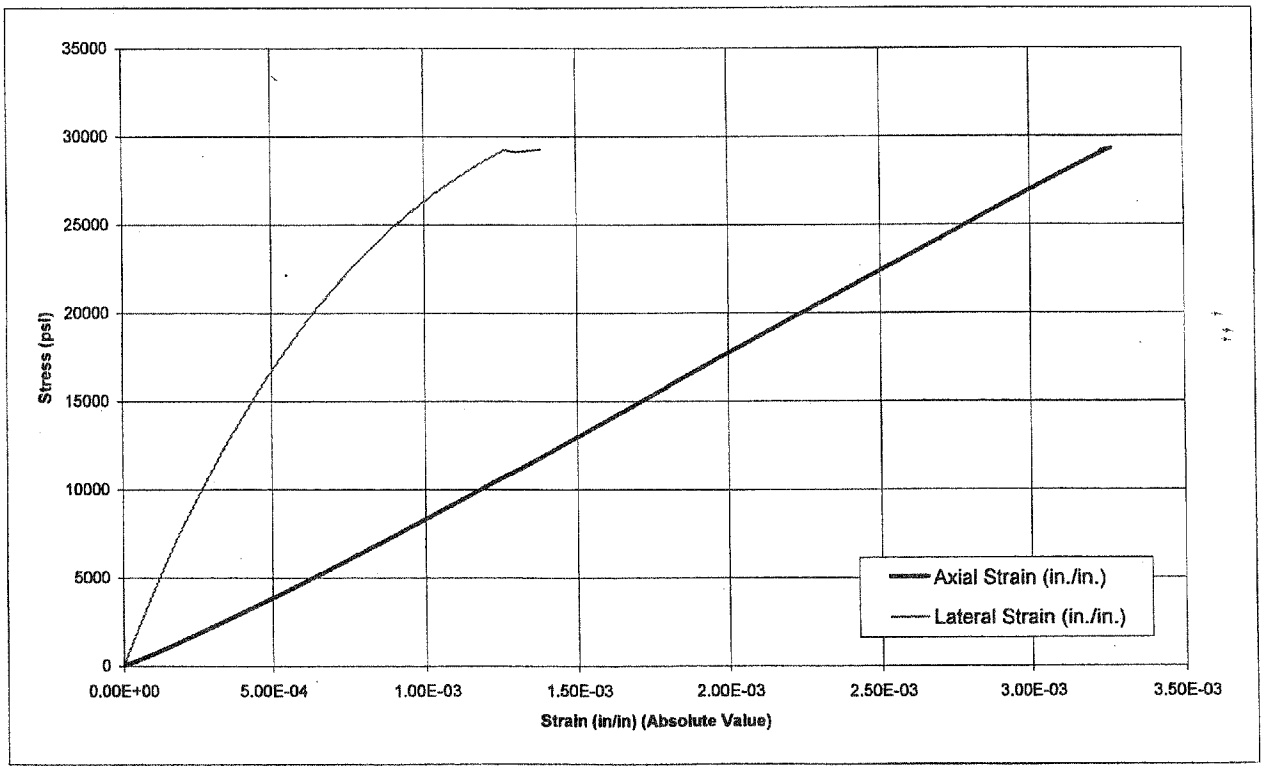
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

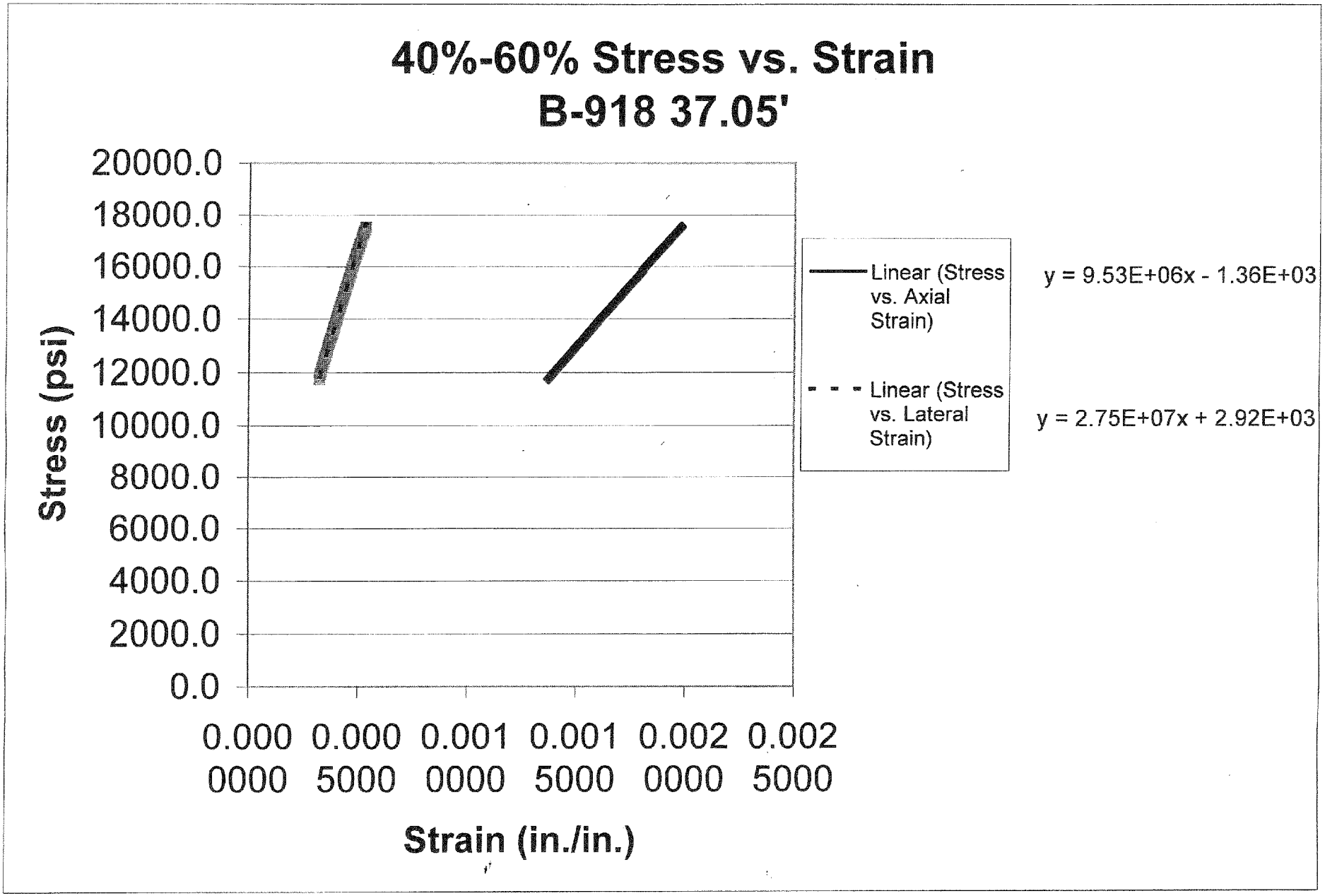
ASTM D 7012-04

Project Name:	North Anna COL		
Project Number:	6468061472		
Boring Number:	918		
Sample Depth (ft):	37.05		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/13/2006	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.397
Specimen Length, inch	5.316
Length/Diameter Ratio	2.22
Unit Weight (lbs/ft^3)	164
Test Duration (Time to Failure in Minutes)	9.1
Unconfined Compressive Strength, psi (from test)	29,287
Unconfined Compressive Strength, psi (with L/D correction)	29,636
Type of Break	Cone & Shear
Young's Modulus, psi	9,530,000
Poisson's Ratio	0.35



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

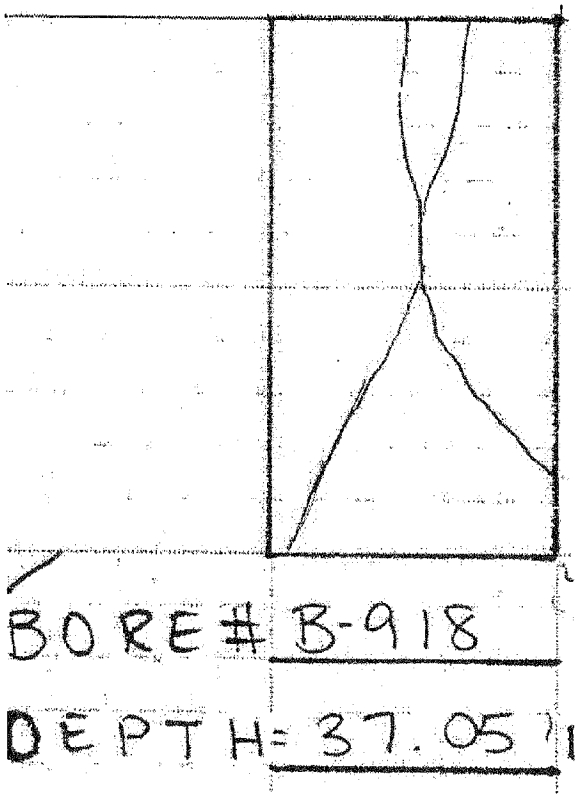

40%-60% Stress vs. Strain
B-918 37.05'
Stress (psi)
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.000 0000
0.000 5000
0.001 0000
0.001 5000
0.002 0000
0.002 5000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 9.53E+06x - 1.36E+03
y = 2.75E+07x + 2.92E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna COL**		
Project Number:	**6468061472**		
Boring Number:	**918**		
Sample Depth (ft):	**37.05**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/13/2006**	**Review Date:**	**12/12/2006**



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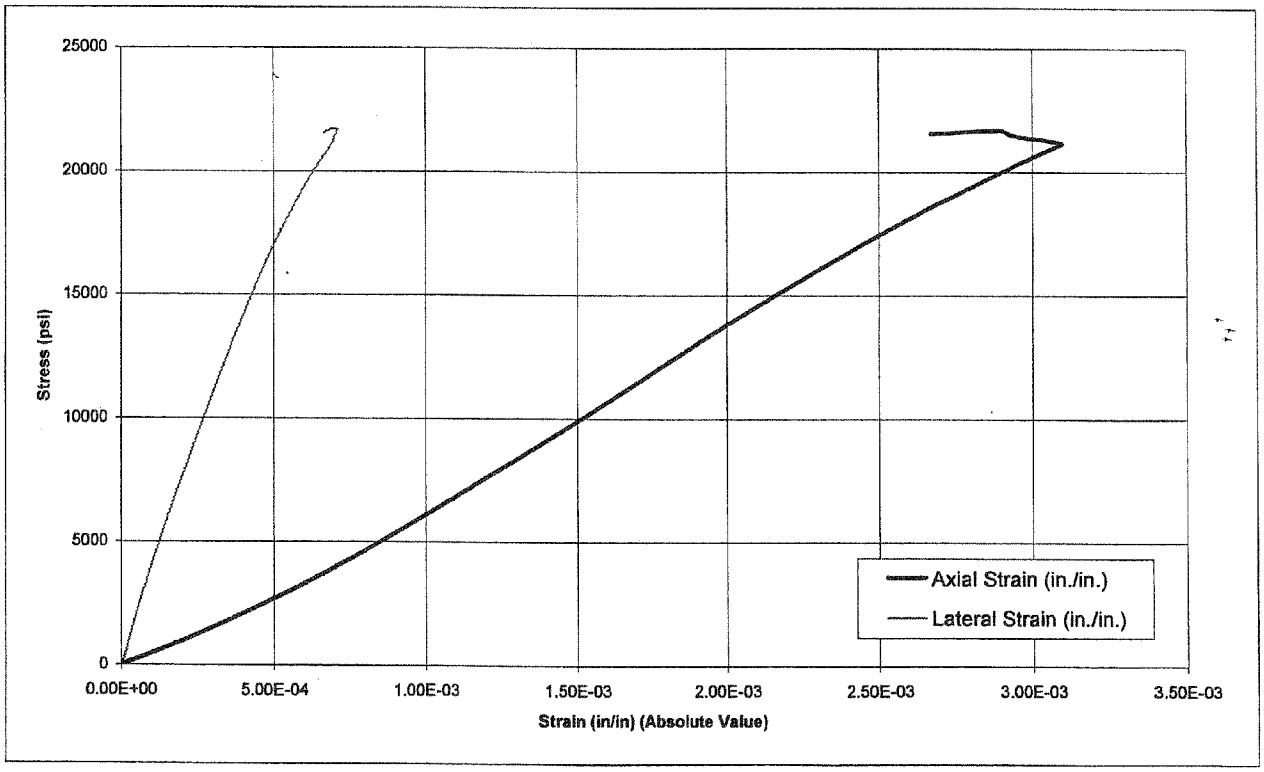
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

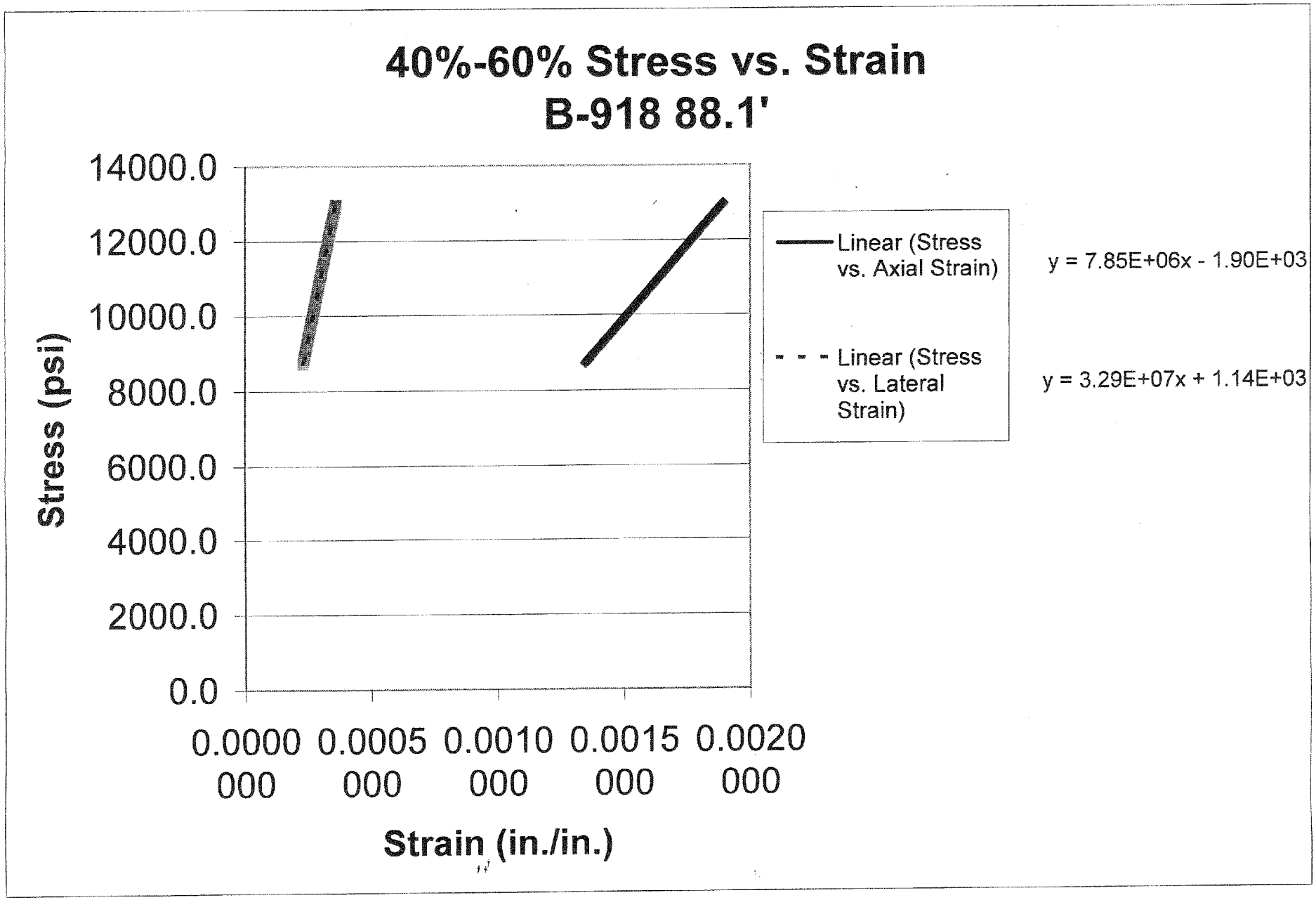
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**918**		
Sample Depth (ft):	**88.1**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSS
Test Date:	**12/13/2006**	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.398**
Specimen Length, inch	**5.283**
Length/Diameter Ratio	**2.20**
Unit Weight (lbs/ft^3)	**165**
Test Duration (Time to Failure in Minutes)	**10.3**
Unconfined Compressive Strength, psi (from test)	**21,701**
Unconfined Compressive Strength, psi (with L/D correction)	**21,944**
Type of Break	**Shear**
Young's Modulus, psi	**7,850,000**
Poisson's Ratio	**0.24**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

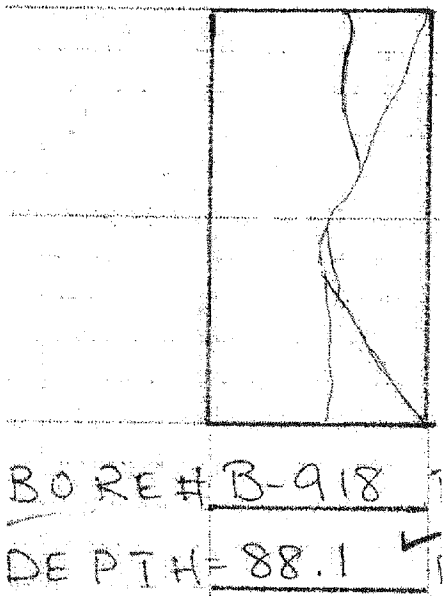

40%-60% Stress vs. Strain
B-918 88.1'
Stress (psi)
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.0000 000
0.0005 000
0.0010 000
0.0015 000
0.0020 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 7.85E+06x - 1.90E+03
y = 3.29E+07x + 1.14E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**918**		
Sample Depth (ft):	**88.1**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/13/2006**	**Review Date:**	1-19-07



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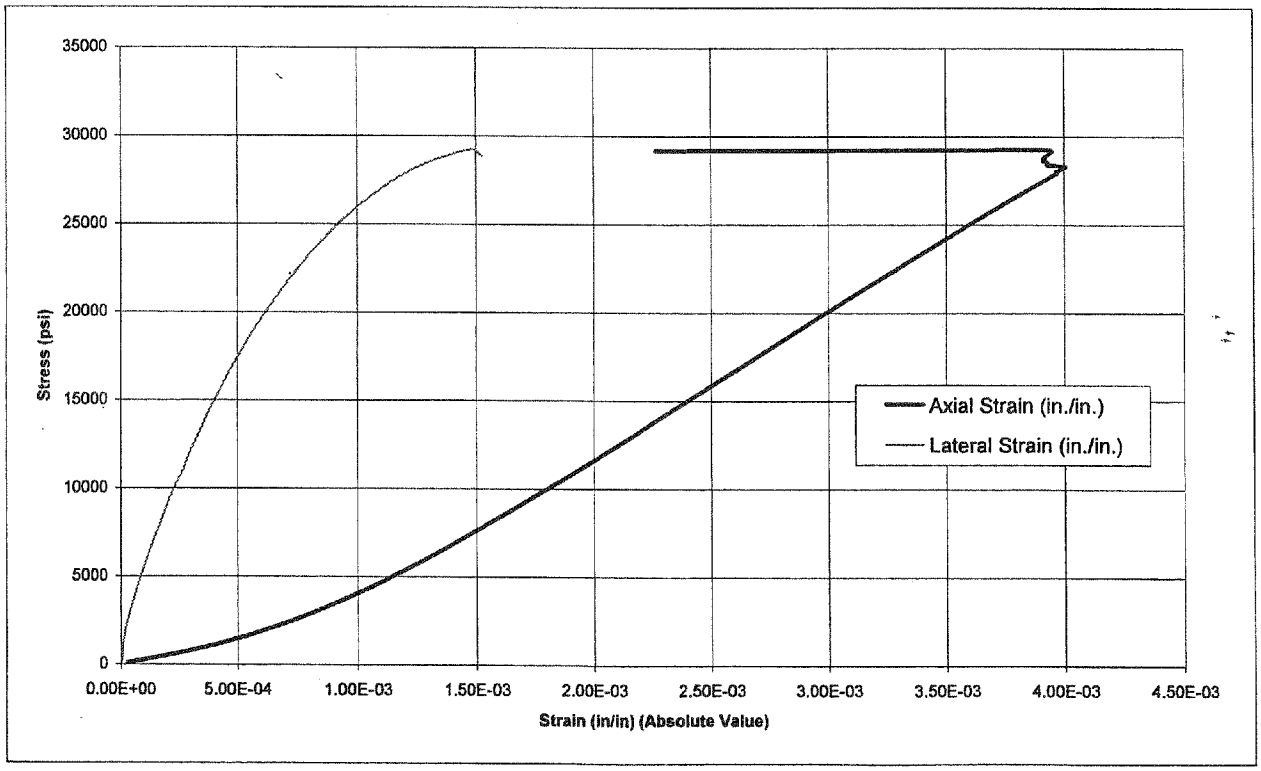
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

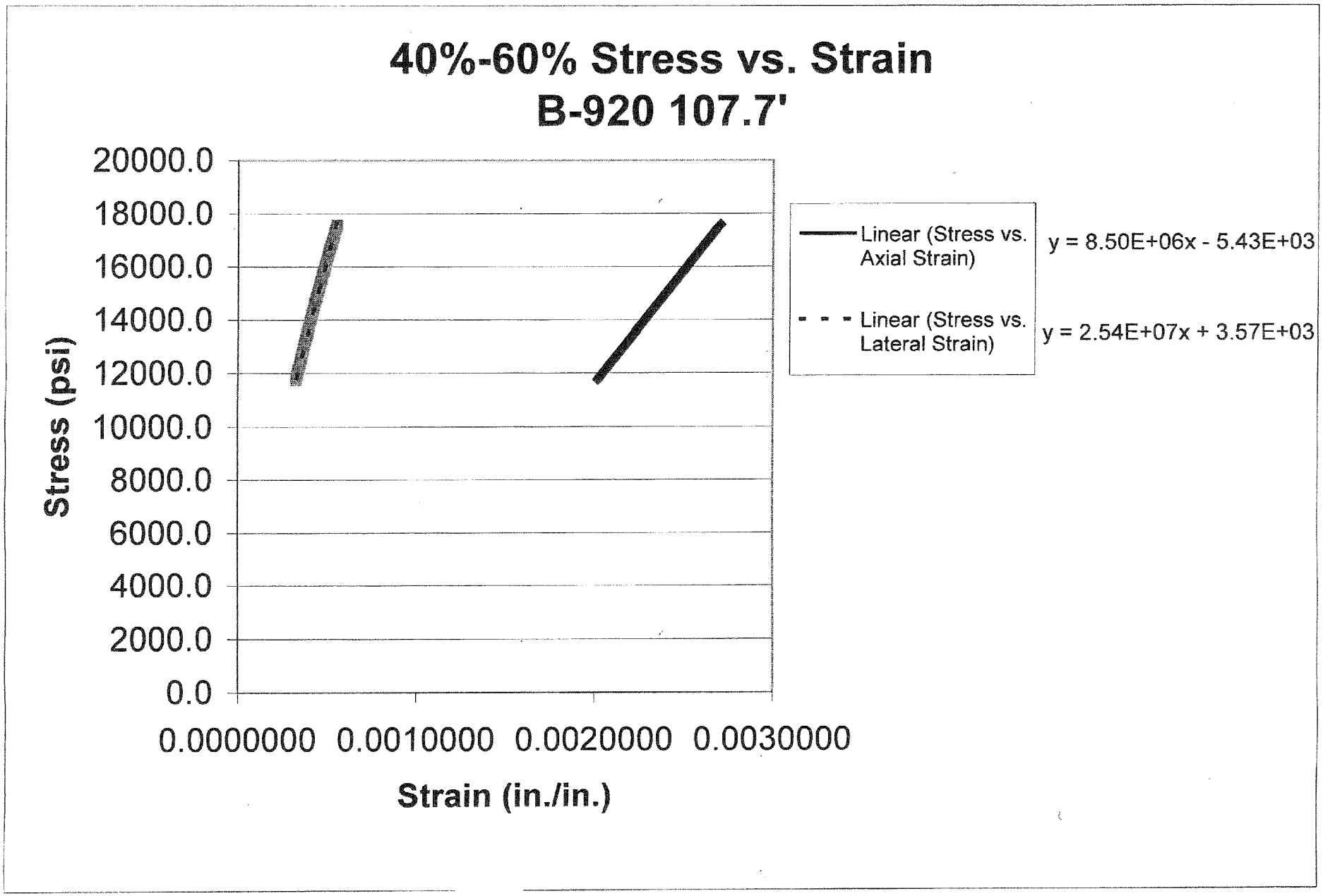
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**920**		
Sample Depth (ft):	**107.7**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.392**
Specimen Length, inch	**5.322**
Length/Diameter Ratio	**2.23**
Unit Weight (lbs/ft^3)	**163**
Test Duration (Time to Failure in Minutes)	**12.8**
Unconfined Compressive Strength, psi (from test)	**29,262**
Unconfined Compressive Strength, psi (with L/D correction)	**29,621**
Type of Break	**Cone**
Young's Modulus, psi	**8,500,000**
Poisson's Ratio	**0.34**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

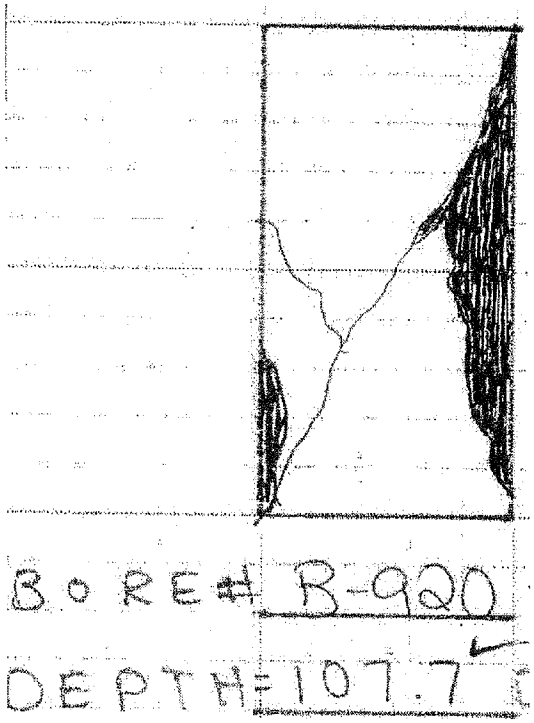

40%-60% Stress vs. Strain
B-920 107.7'
Stress (psi)
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.0000000
0.0010000
0.0020000
0.0030000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
y = 8.50E+06x - 5.43E+03
Linear (Stress vs. Lateral Strain)
y = 2.54E+07x + 3.57E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**920**		
Sample Depth (ft):	**107.7**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



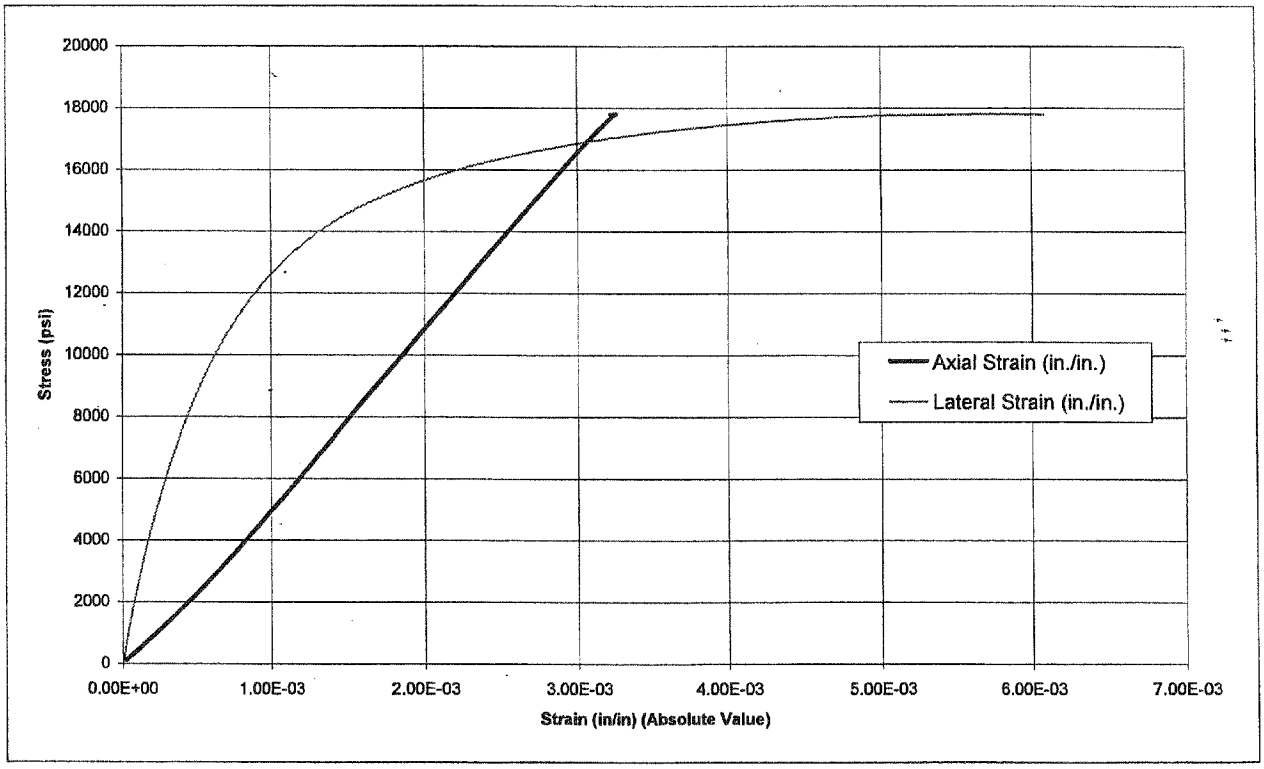
MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

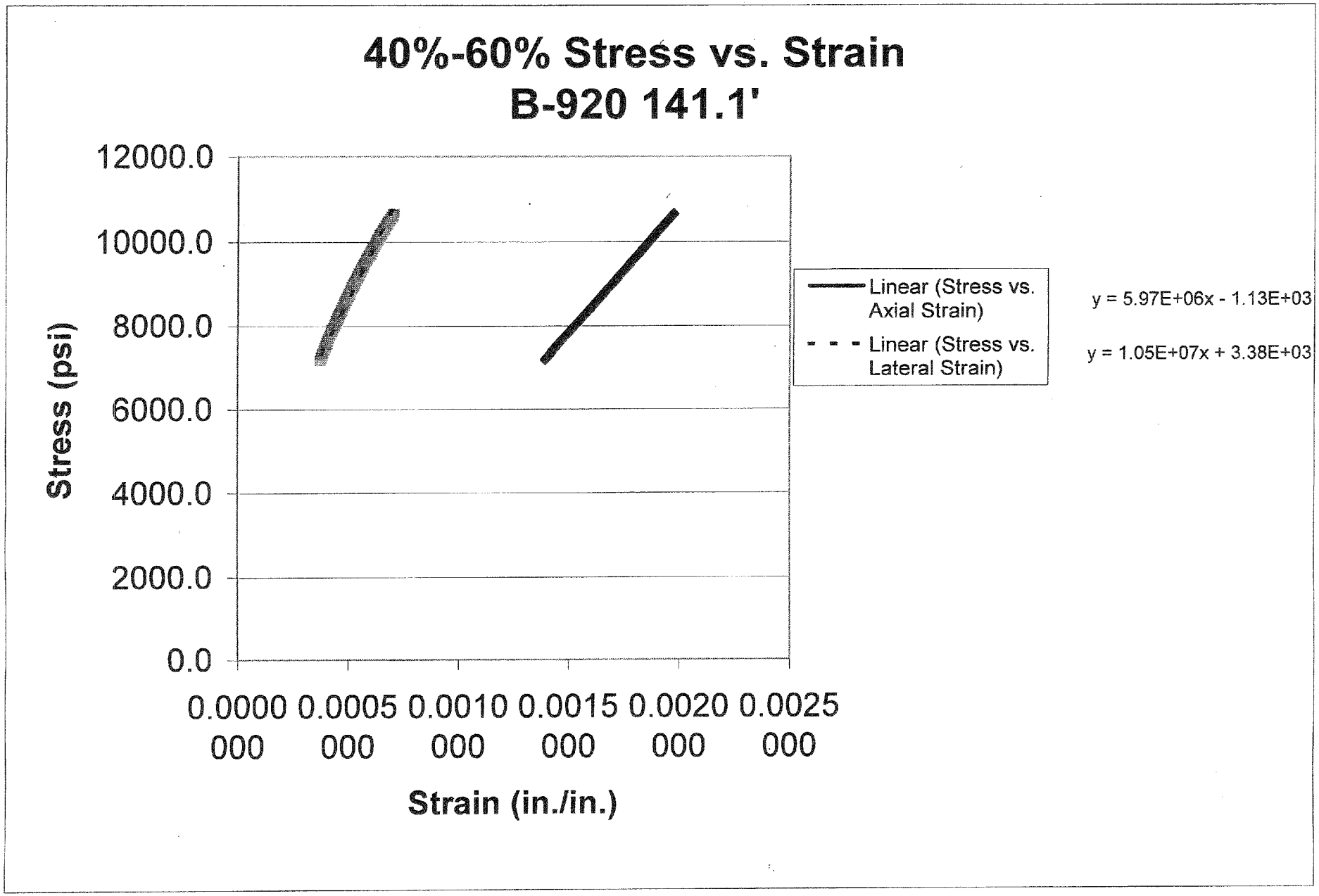
ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	920		
Sample Depth (ft):	141.1		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/5/2006	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.398
Specimen Length, inch	5.345
Length/Diameter Ratio	2.23
Unit Weight (lbs/ft^3)	166
Test Duration (Time to Failure in Minutes)	8.7
Unconfined Compressive Strength, psi (from test)	17,817
Unconfined Compressive Strength, psi (with L/D correction)	18,040
Type of Break	Cone
Young's Modulus, psi	5,970,000
Poisson's Ratio	*



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.
* = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.

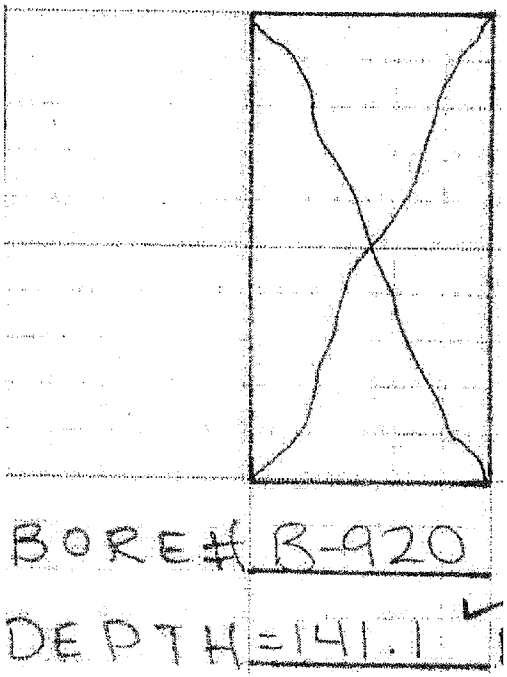

40%-60% Stress vs. Strain
B-920 141.1'
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.0000 000
0.0005 000
0.0010 000
0.0015 000
0.0020 000
0.0025 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 5.97E+06x - 1.13E+03
y = 1.05E+07x + 3.38E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**920**		
Sample Depth (ft):	**141.1**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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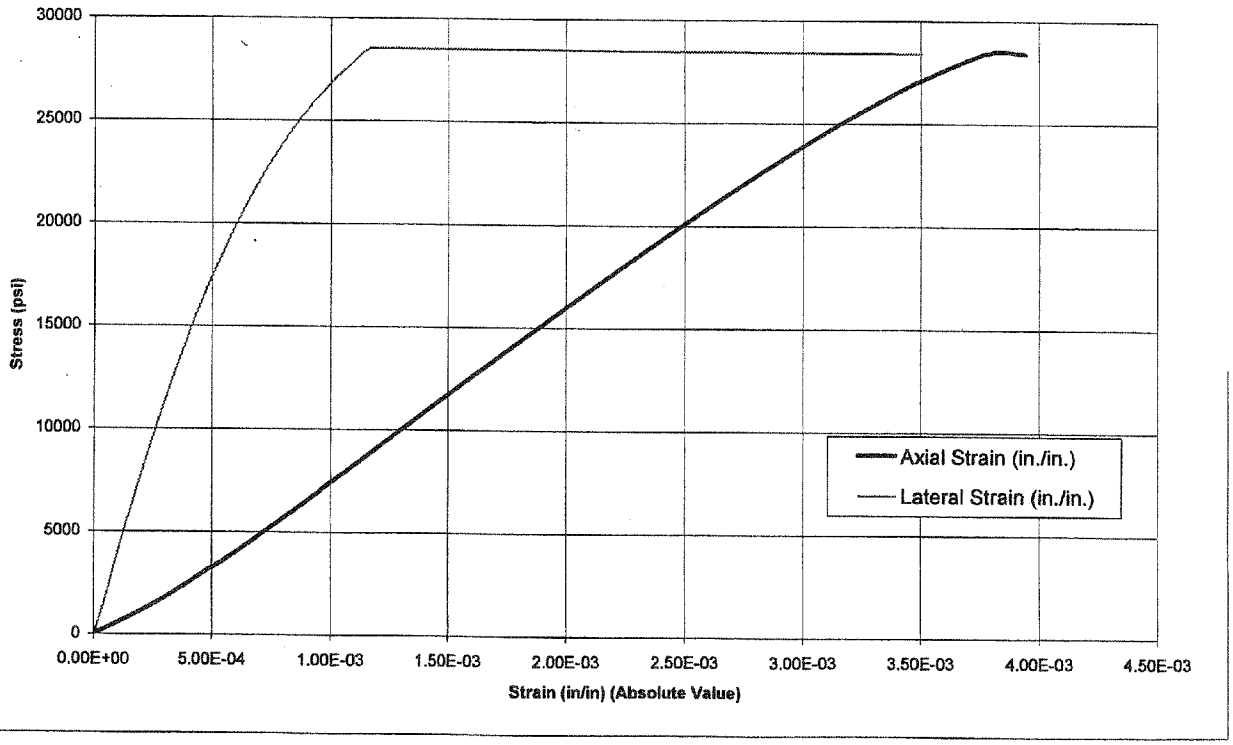
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

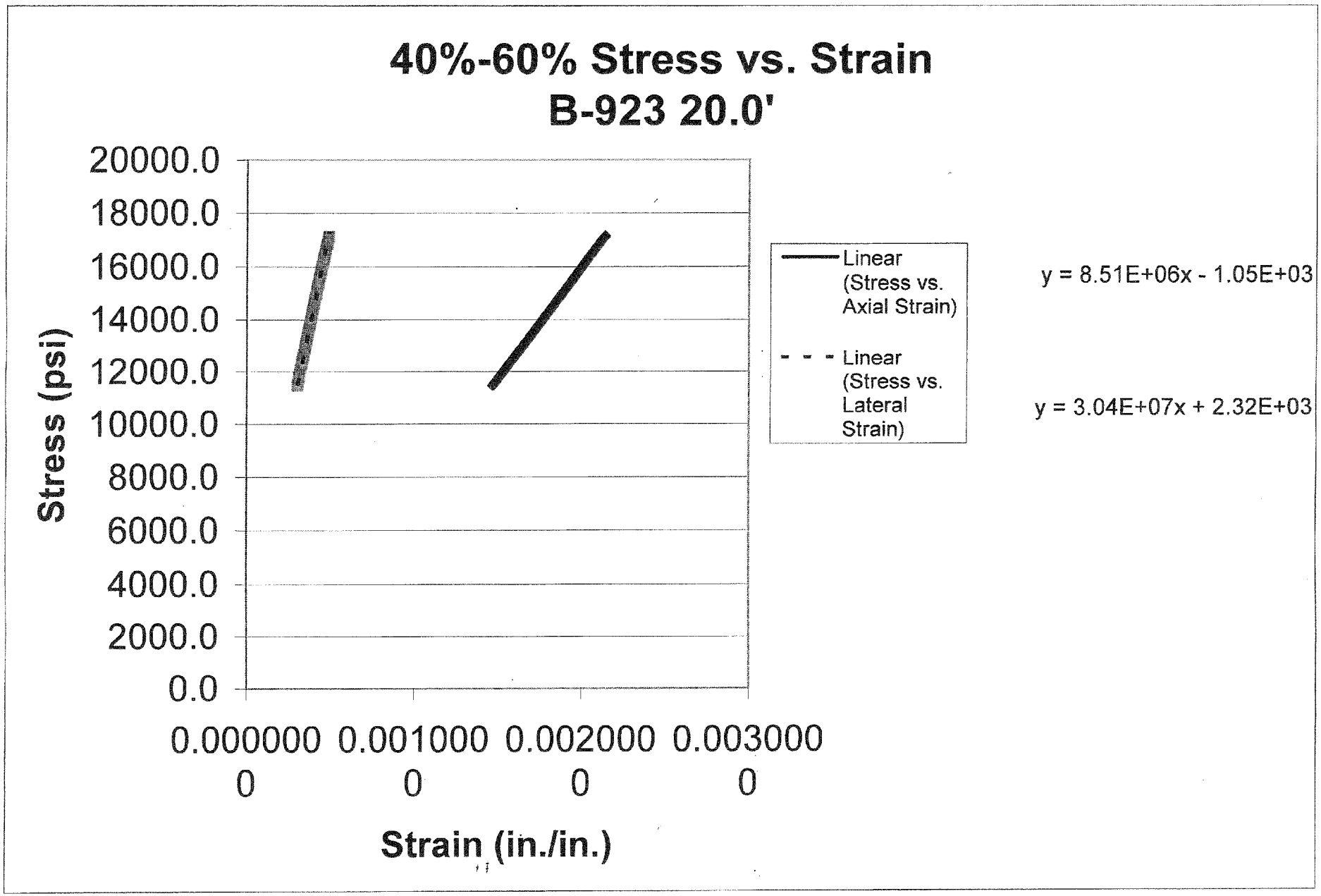
ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	923		
Sample Depth (ft):	20		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/1/2006	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.387
Specimen Length, inch	5.348
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	164
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	28,538
Unconfined Compressive Strength, psi (with L/D correction)	28,911
Type of Break	Cone & Shear
Young's Modulus, psi	8,510,000
Poisson's Ratio	0.28



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

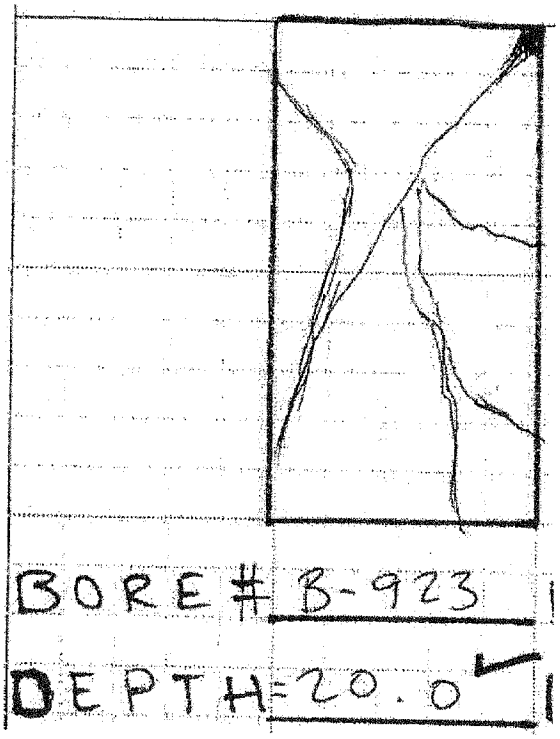

40%-60% Stress vs. Strain
B-923 20.0'
Stress (psi)
20000.0
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.000000
0.001000
0.002000
0.003000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 8.51E+06x - 1.05E+03
y = 3.04E+07x + 2.32E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**923**		
Sample Depth (ft):	**20**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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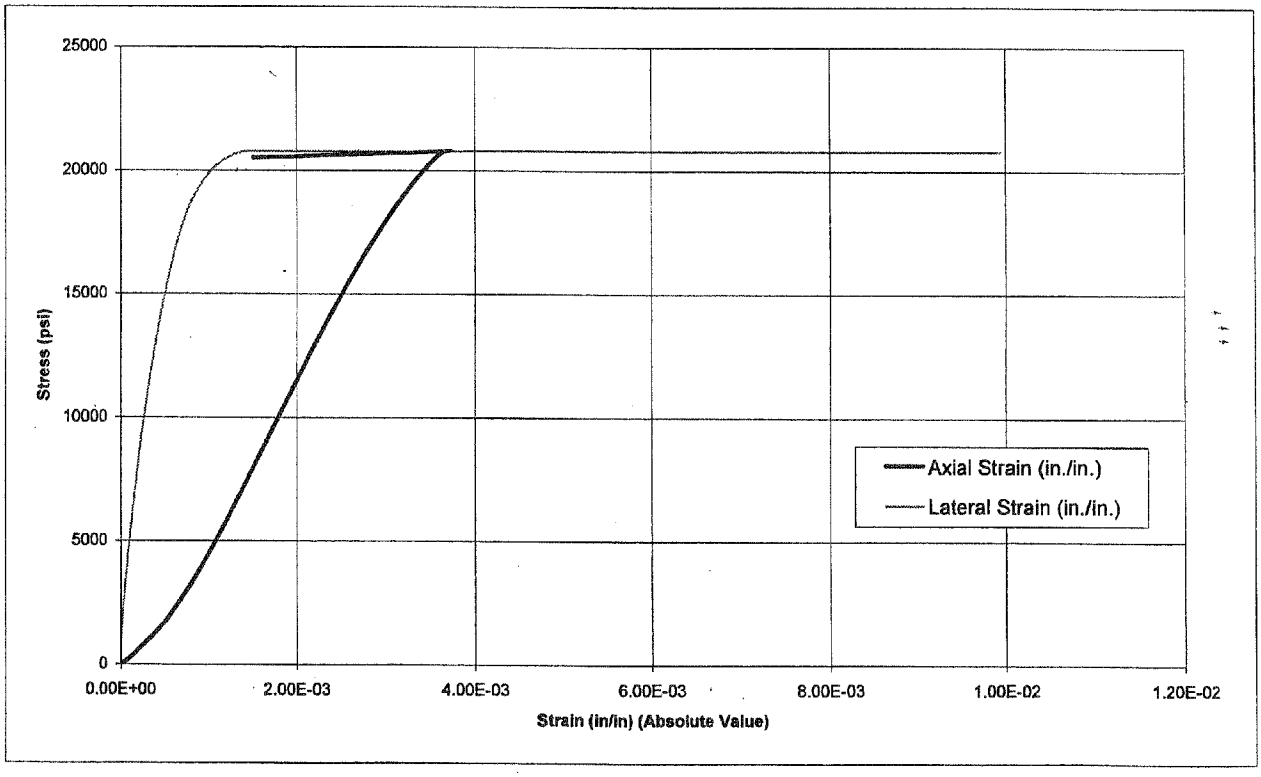
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

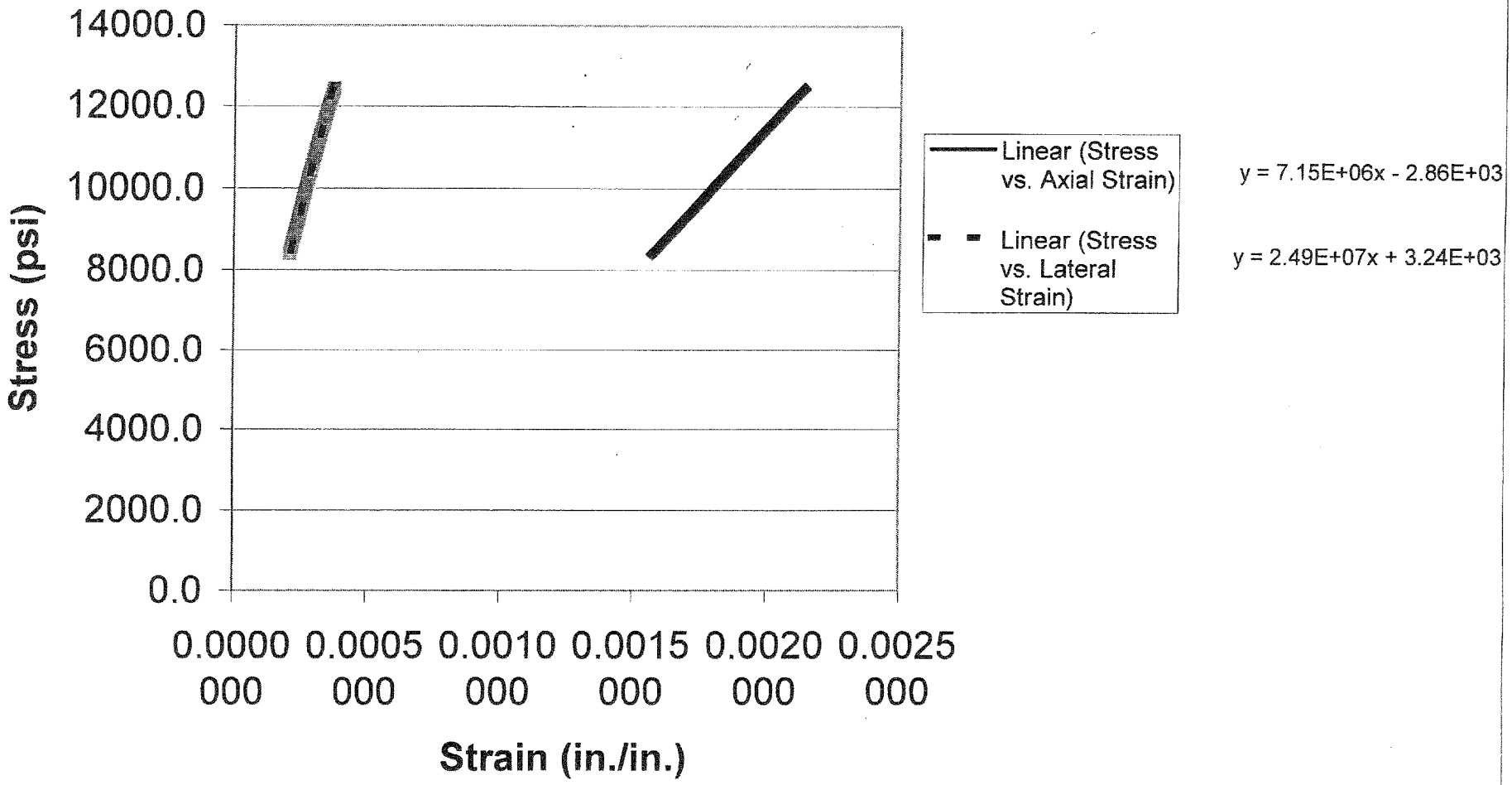
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**923**		
Sample Depth (ft):	**65.65**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.388**
Specimen Length, inch	**5.348**
Length/Diameter Ratio	**2.24**
Unit Weight (lbs/ft^3)	**164**
Test Duration (Time to Failure in Minutes)	**6.8**
Unconfined Compressive Strength, psi (from test)	**20,798**
Unconfined Compressive Strength, psi (with L/D correction)	**21,069**
Type of Break	**Cone**
Young's Modulus, psi	**7,150,000**
Poisson's Ratio	**0.29**



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

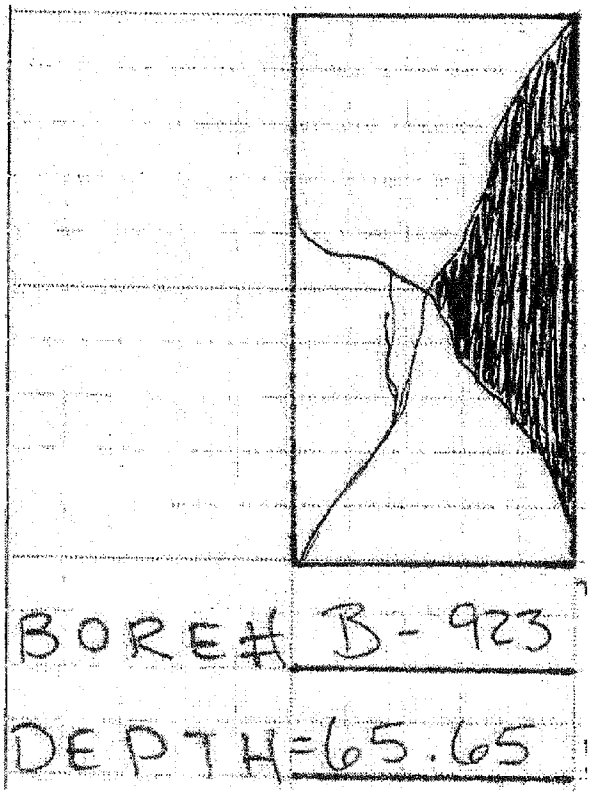

40%-60% Stress vs. Strain
B-923 65.65'
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.0000 000
0.0005 000
0.0010 000
0.0015 000
0.0020 000
0.0025 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 7.15E+06x - 2.86E+03
y = 2.49E+07x + 3.24E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**923**		
Sample Depth (ft):	**65.65**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



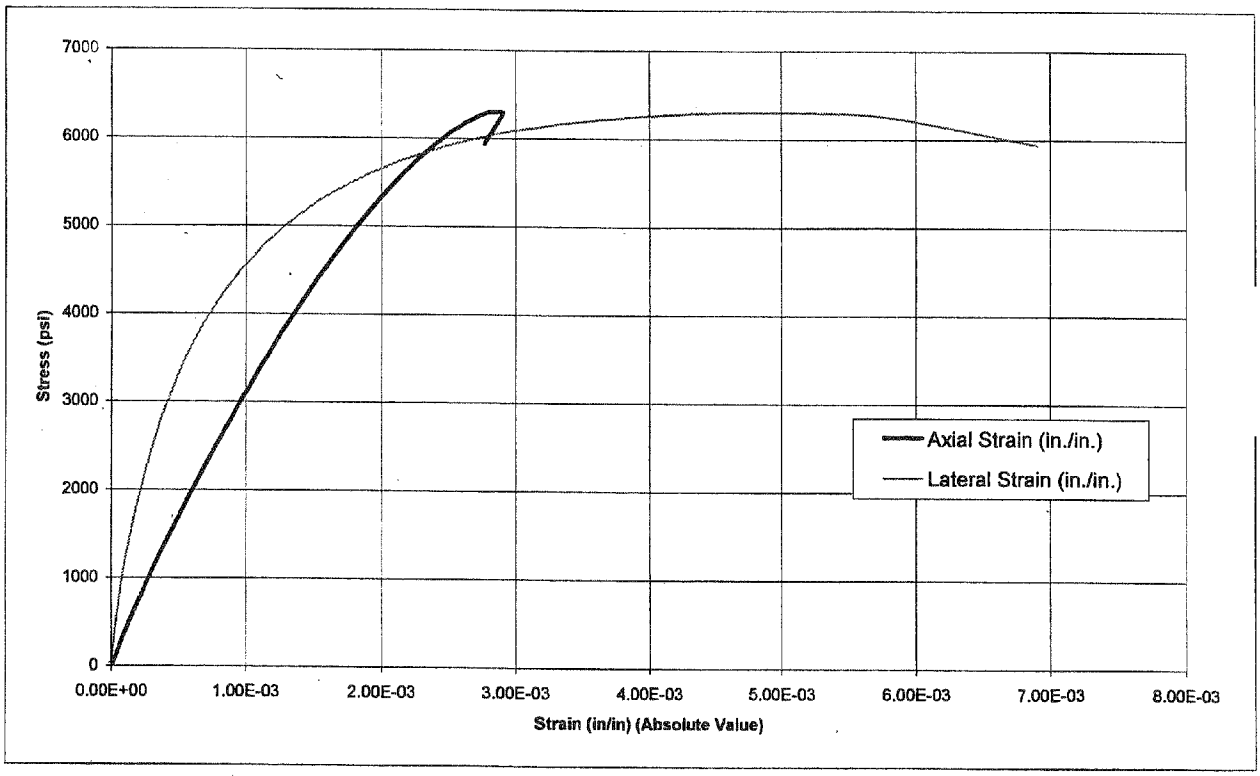
MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

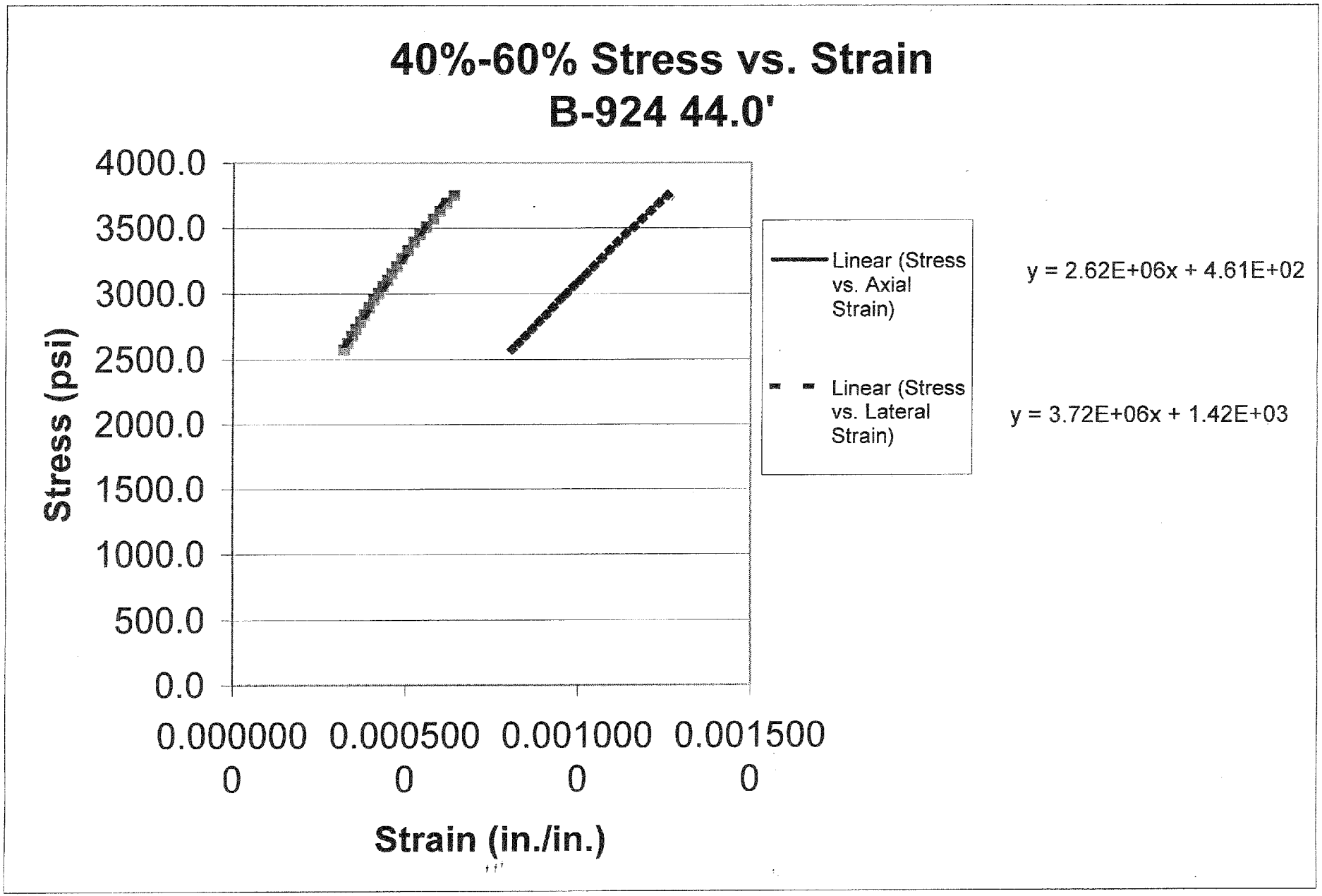
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**924**		
Sample Depth (ft):	**44**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	**Biotite-Quartz Gneiss**
Moisture Condition	**As Received**
Specimen Diameter, inch	**2.389**
Specimen Length, inch	**5.332**
Length/Diameter Ratio	**2.23**
Unit Weight (lbs/ft^3)	**174**
Test Duration (Time to Failure in Minutes)	**4.4**
Unconfined Compressive Strength, psi (from test)	**6,304**
Unconfined Compressive Strength, psi (with L/D correction)	**6,384**
Type of Break	**Shear**
Young's Modulus, psi	**2,620,000**
Poisson's Ratio	*



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.
* = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.


40%-60% Stress vs. Strain
B-924 44.0'
Stress (psi)
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000000
0.0005000
0.0010000
0.0015000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 2.62E+06x + 4.61E+02
y = 3.72E+06x + 1.42E+03

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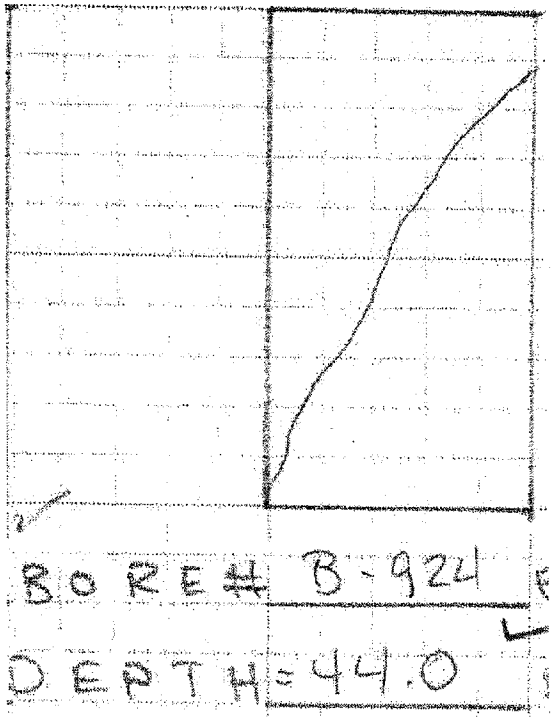
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**924**		
Sample Depth (ft):	**44**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



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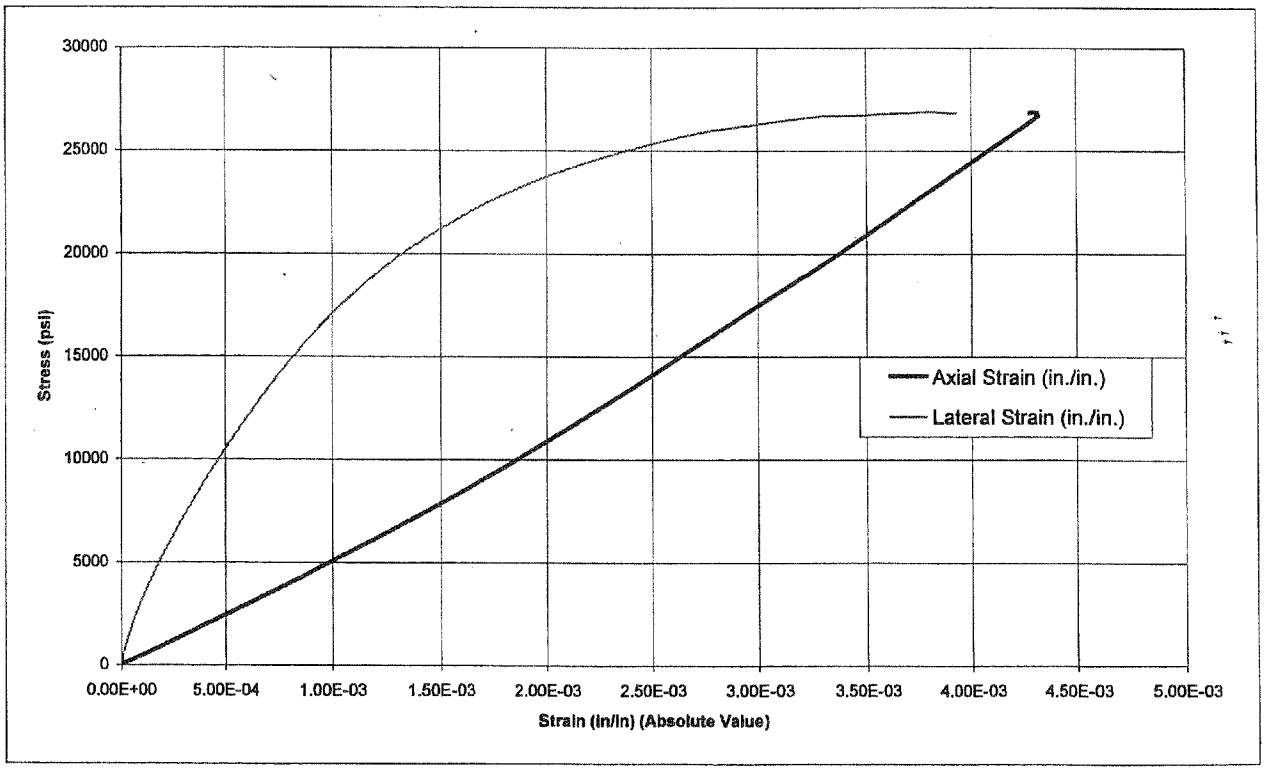
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

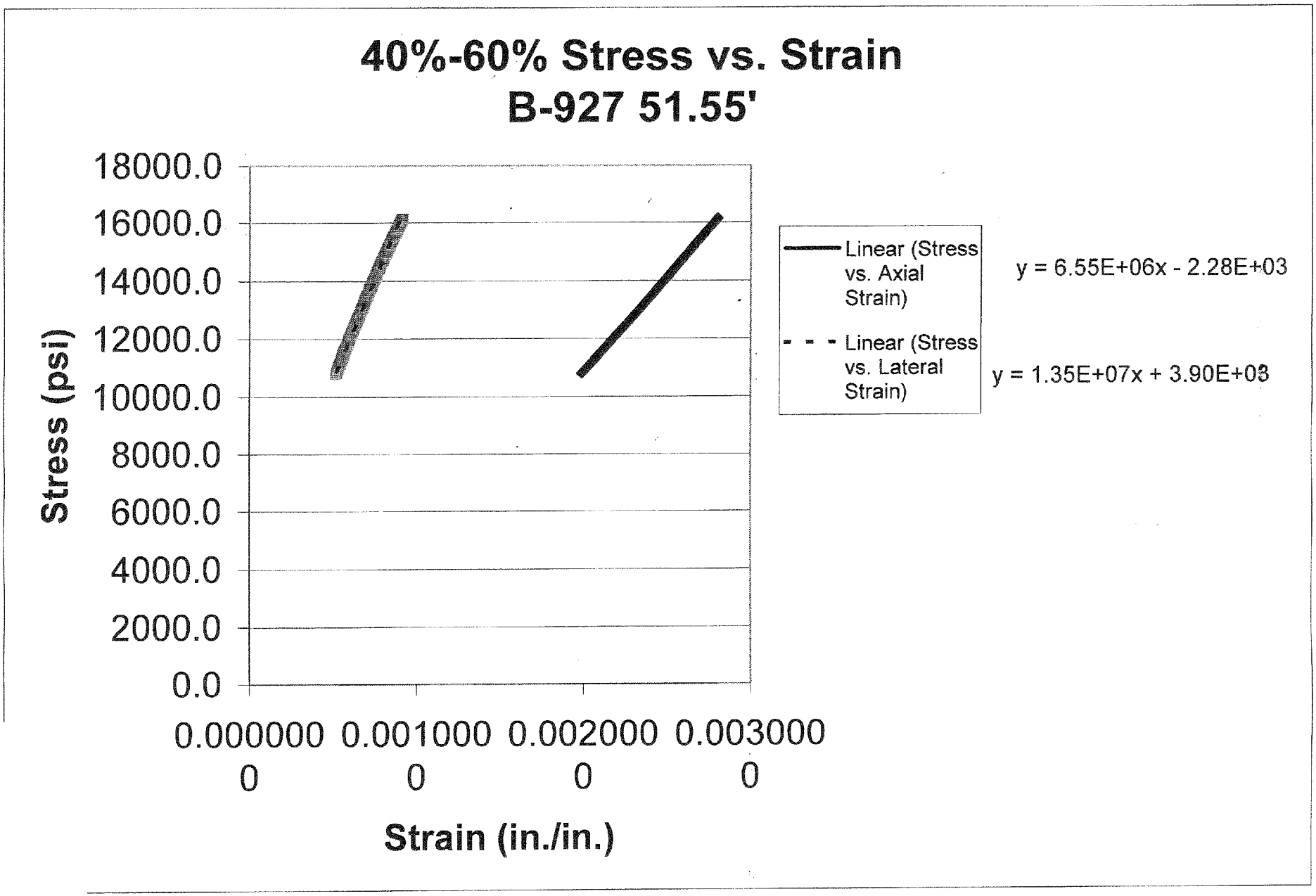
ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	927		
Sample Depth (ft):	51.55		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSS
Test Date:	12/5/2006	**Review Date:**	1-19-07

Rock Type	Quartz-Biotite Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.392
Specimen Length, inch	5.350
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	163
Test Duration (Time to Failure in Minutes)	11.3
Unconfined Compressive Strength, psi (from test)	26,893
Unconfined Compressive Strength, psi (with L/D correction)	27,239
Type of Break	Cone & Shear
Young's Modulus, psi	6,550,000
Poisson's Ratio	0.49



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.


40%-60% Stress vs. Strain
B-927 51.55'
Stress (psi)
18000.0
16000.0
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
0.000000
0.001000
0.002000
0.003000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 6.55E+06x - 2.28E+03
y = 1.35E+07x + 3.90E+03

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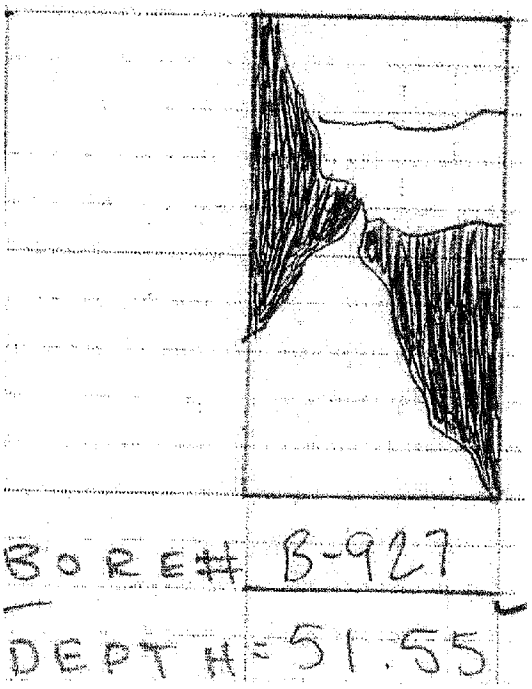
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**927**		
Sample Depth (ft):	**51.55**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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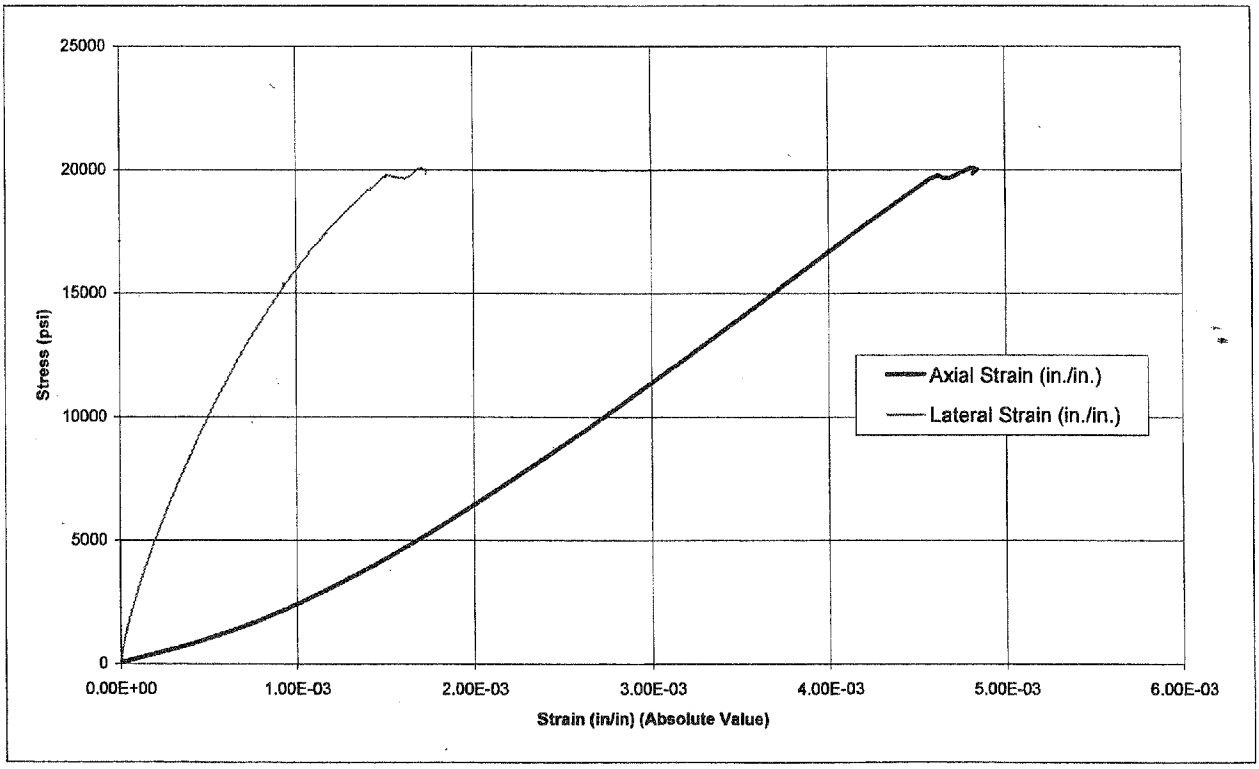
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

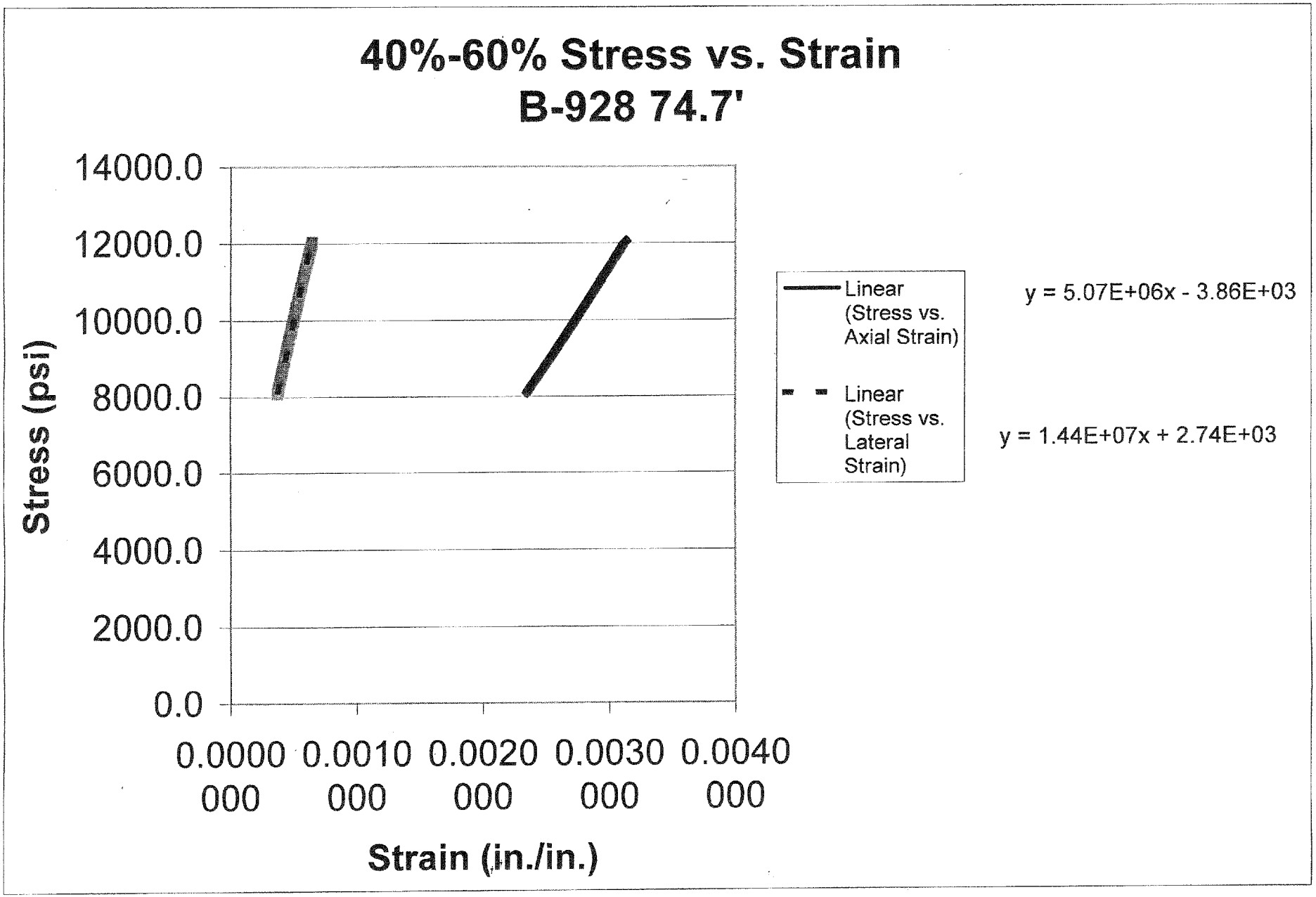
ASTM D 7012-04

Project Name:	North Anna		
Project Number:	6468061472		
Boring Number:	928		
Sample Depth (ft):	74.7		
Tested By:	Jacob B. Mock	**Reviewed By:**	DSC
Test Date:	12/5/2006	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.389
Specimen Length, inch	5.349
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	162
Test Duration (Time to Failure in Minutes)	6.7
Unconfined Compressive Strength, psi (from test)	20,072
Unconfined Compressive Strength, psi (with L/D correction)	20,333
Type of Break	Cone
Young's Modulus, psi	5,070,000
Poisson's Ratio	0.35



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.

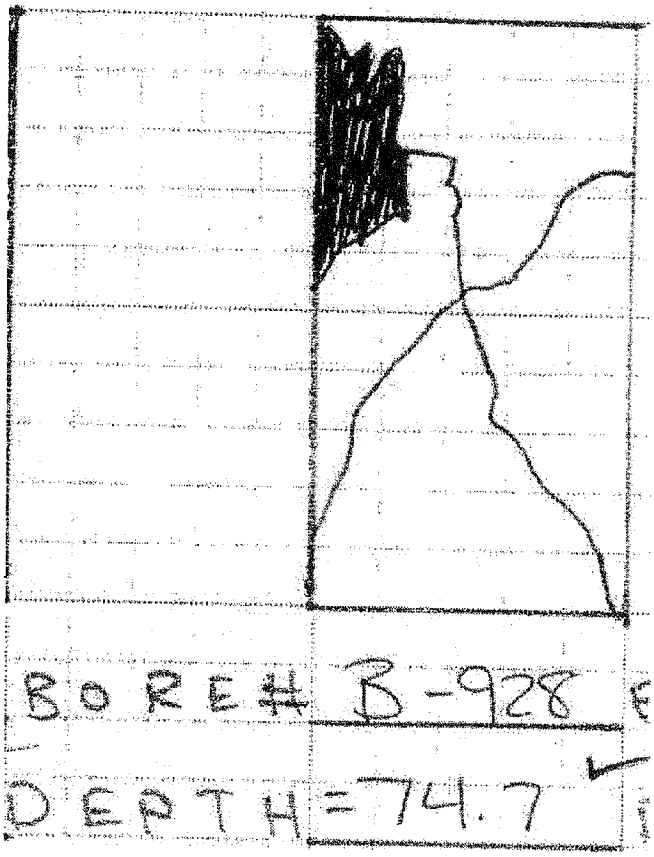

40%-60% Stress vs. Strain
B-928 74.7'
14000.0
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
0.0
Stress (psi)
0.0000 000
0.0010 000
0.0020 000
0.0030 000
0.0040 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 5.07E+06x - 3.86E+03
y = 1.44E+07x + 2.74E+03

MACTEC

Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**928**		
Sample Depth (ft):	**74.7**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/5/2006**	**Review Date:**	**12/12/2006**



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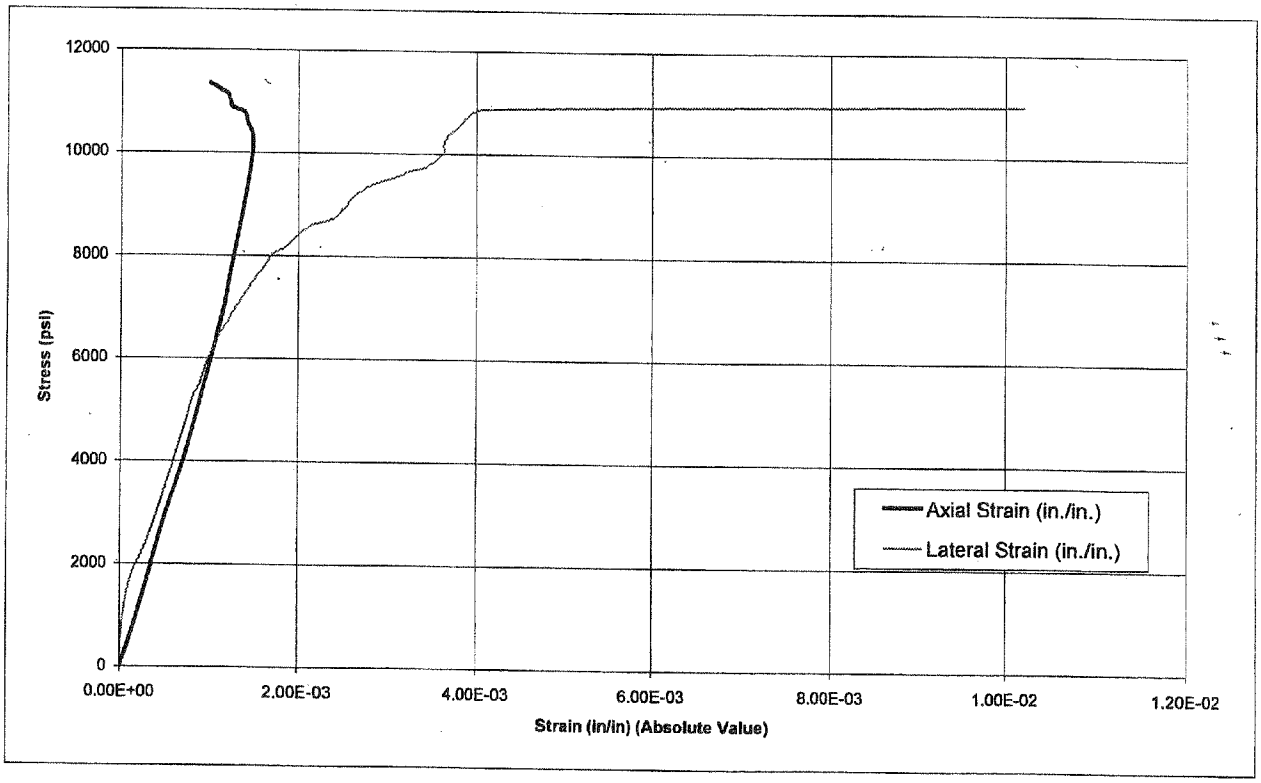
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

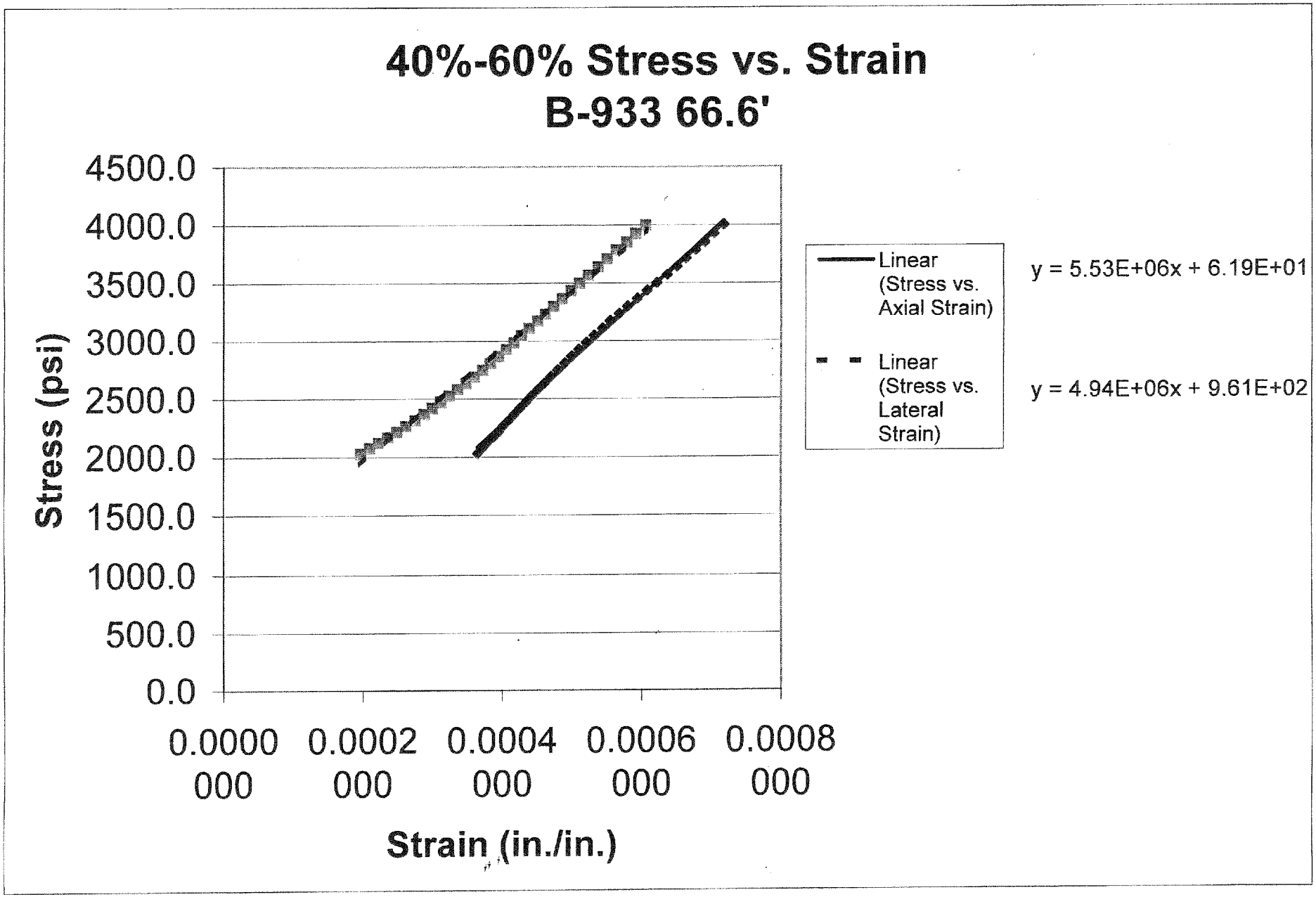
ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**933**		
Sample Depth (ft):	**66.6**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	DSC
Test Date:	**12/1/2006**	**Review Date:**	1-19-07

Rock Type	Biotite-Quartz Gneiss
Moisture Condition	As Received
Specimen Diameter, inch	2.382
Specimen Length, inch	5.338
Length/Diameter Ratio	2.24
Unit Weight (lbs/ft^3)	162
Test Duration (Time to Failure in Minutes)	6.8
Unconfined Compressive Strength, psi (from test)	15,561
Unconfined Compressive Strength, psi (with L/D correction)	15,764
Type of Break	Shear
Young's Modulus, psi	5,500,000
Poisson's Ratio	*



Comments: Young's Modulus and Poisson's Ratio determined using linear fit of curve from approximately 40% to 60% of unconfined compressive strength.
Strain values shown are in terms of absolute value: Axial Strain is negative, Lateral Strain is positive.
* = Value of Poisson's ratio is greater than 0.5 which indicates inelastic behavior probably due to presence of fractures or discontinuities affecting lateral strain.


40%-60% Stress vs. Strain
B-933 66.6'
Stress (psi)
4500.0
4000.0
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
0.0000 000
0.0002 000
0.0004 000
0.0006 000
0.0008 000
Strain (in./in.)
Linear (Stress vs. Axial Strain)
Linear (Stress vs. Lateral Strain)
y = 5.53E+06x + 6.19E+01
y = 4.94E+06x + 9.61E+02

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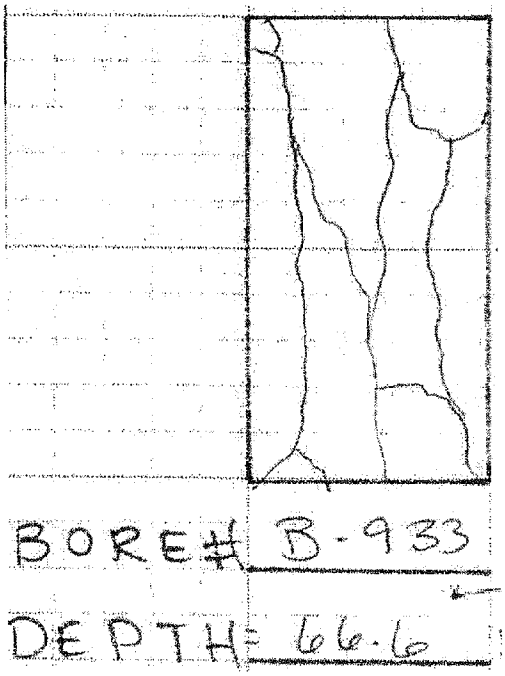
Elastic Moduli of Intact Rock Core Specimens in Uniaxial Compression

ASTM D 7012-04

Project Name:	**North Anna**		
Project Number:	**6468061472**		
Boring Number:	**933**		
Sample Depth (ft):	**66.6**		
Tested By:	**Jacob B. Mock**	**Reviewed By:**	**DSC**
Test Date:	**12/1/2006**	**Review Date:**	**12/12/2006**



APPENDIX G

LABORATORY TEST DATA FOR RESONANT COLUMN TORSIONAL SHEAR

THESE TESTS ARE IN PROGRESS AS OF 1-23-07. RESULTS WILL BE SUBMITTED AS AN ADDENDUM TO THE GEOTECHNICAL DATA REPORT.

NORTH ANNA COL

DATA REPORT REV. 0
JANUARY 23, 2007

MACTEC PROJECT NO. 6468-06-1472