Los Alamos
Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO: Hugh Murphy, G-5, MS 981

DATE: 14 September 1981

FROM: Tom Dey (Tom)

MAIL STOP/TELEPHONE: ms977/x7140

SYMBOL: G-7

SUBJECT: HDR ROCK MECHANICS - AUGUST 1981

Testing of samples from EE-2 at high temperatures and pressures continues. Data from samples 13962 and 11739 is attached. Thermal expansion coefficients show a broad range from sample to sample. Sample 11739 gives a value of about 14 ppm/°C at high temperatures and pressures. Sample 13962 shows a decrease in modulus on going from room to high temperatures. Bulk modulus decreases from about 40 GPa to about 32 GPa at 247°C. Young's modulus declines from around 16 GPa at 24°C to around 10 GPa at 244°C. Further data reduction is needed on 11739 before this comparison can be made. All these moduli measurements are conducted under poorly drained conditions where the pore fluid pressure changes do not have time to diffuse.

Further testing of cement used for EE-3 casing has been done. A long-term test is now underway. Some samples are being cooked at 200°C and water vapor pressure for at least six months. They will then be tested for strength, modulus, and mineralogy changes.

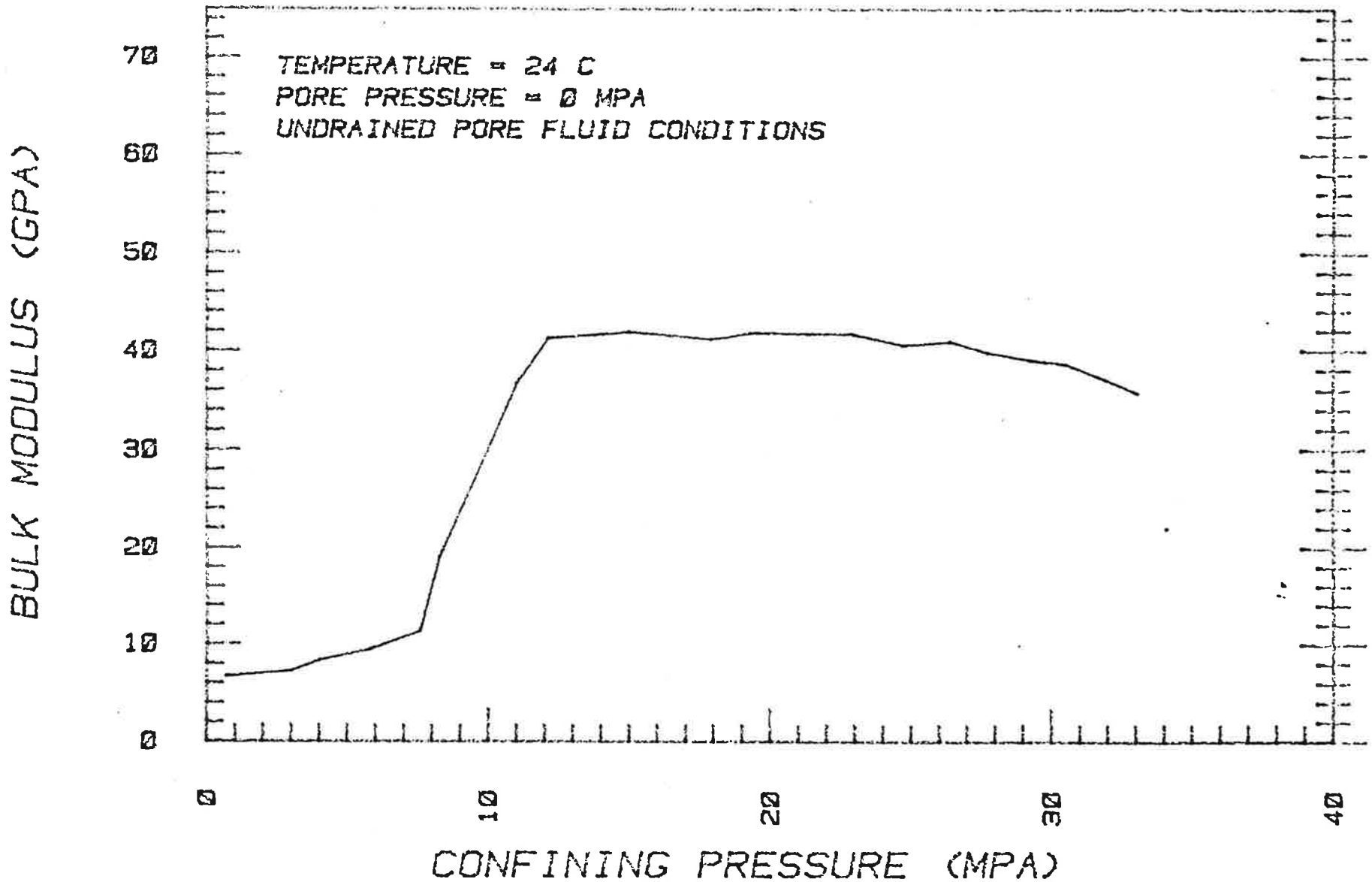
The effect of the intermediate principal stress on hydraulic fracturing from an inclined hole is being studied. Tests are being done in 6" cubes of plexiglas. Most of the experimental problems have now been solved so I should be getting some usable data soon. These tests are being given a high priority, so other measurements will be delayed.

TD:jm

cy: J. Albright, G-7, MS 335
T. Dey/C. Pearson, G-7, MS 977
R. Aamodt/D. Brown/B. Potter, G-5, MS 981
H. Fisher, G-6, MS 981
R. Spence, G-DOF, MS 980
B. Killian, G-DO, MS 570
G-7 file, MS 676
G-1 file, MS 983

EE-2 SAMPLE 13962A

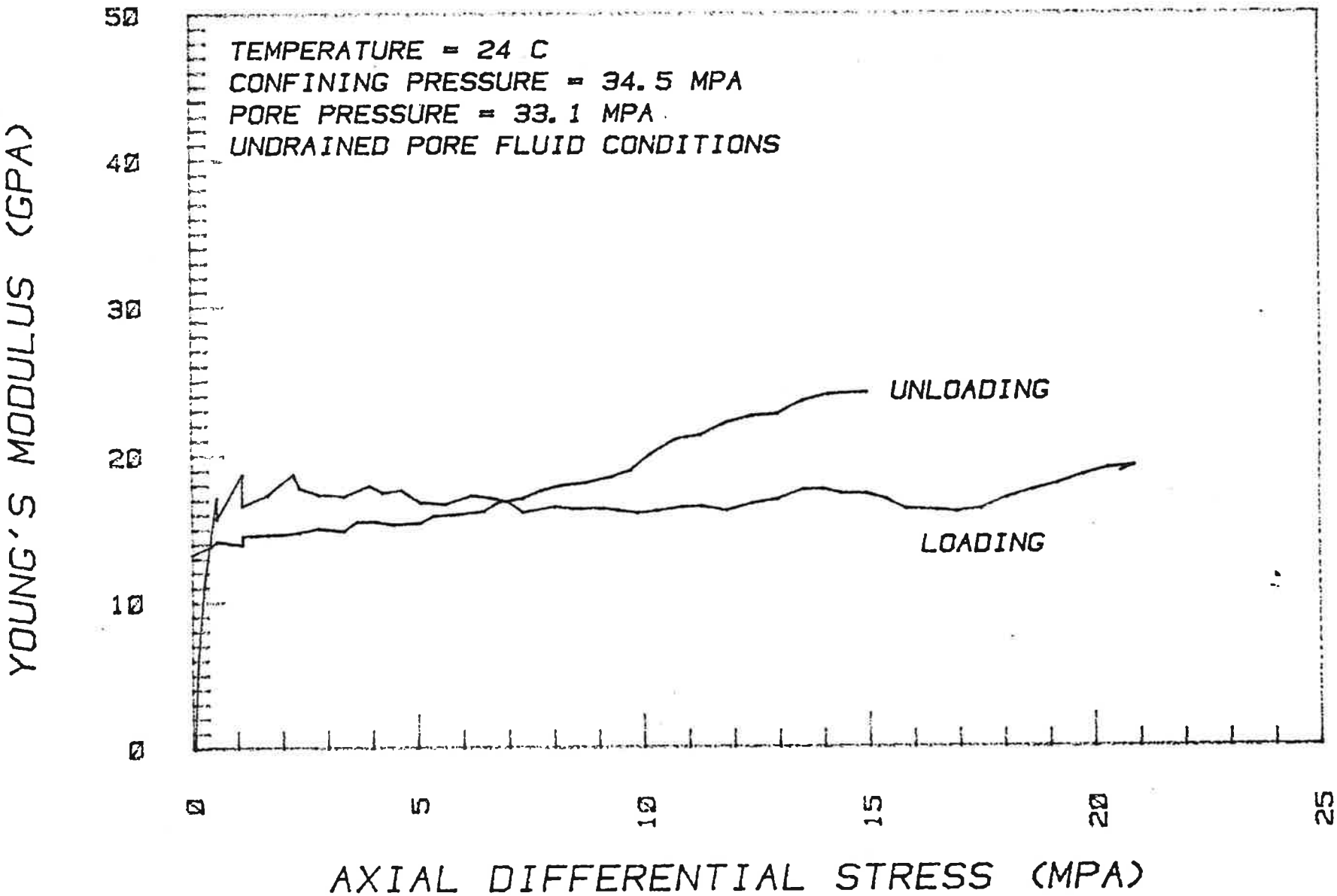
HYDROSTATIC COMPRESSION



13-AUG-81

EE-2 SAMPLE 13962A

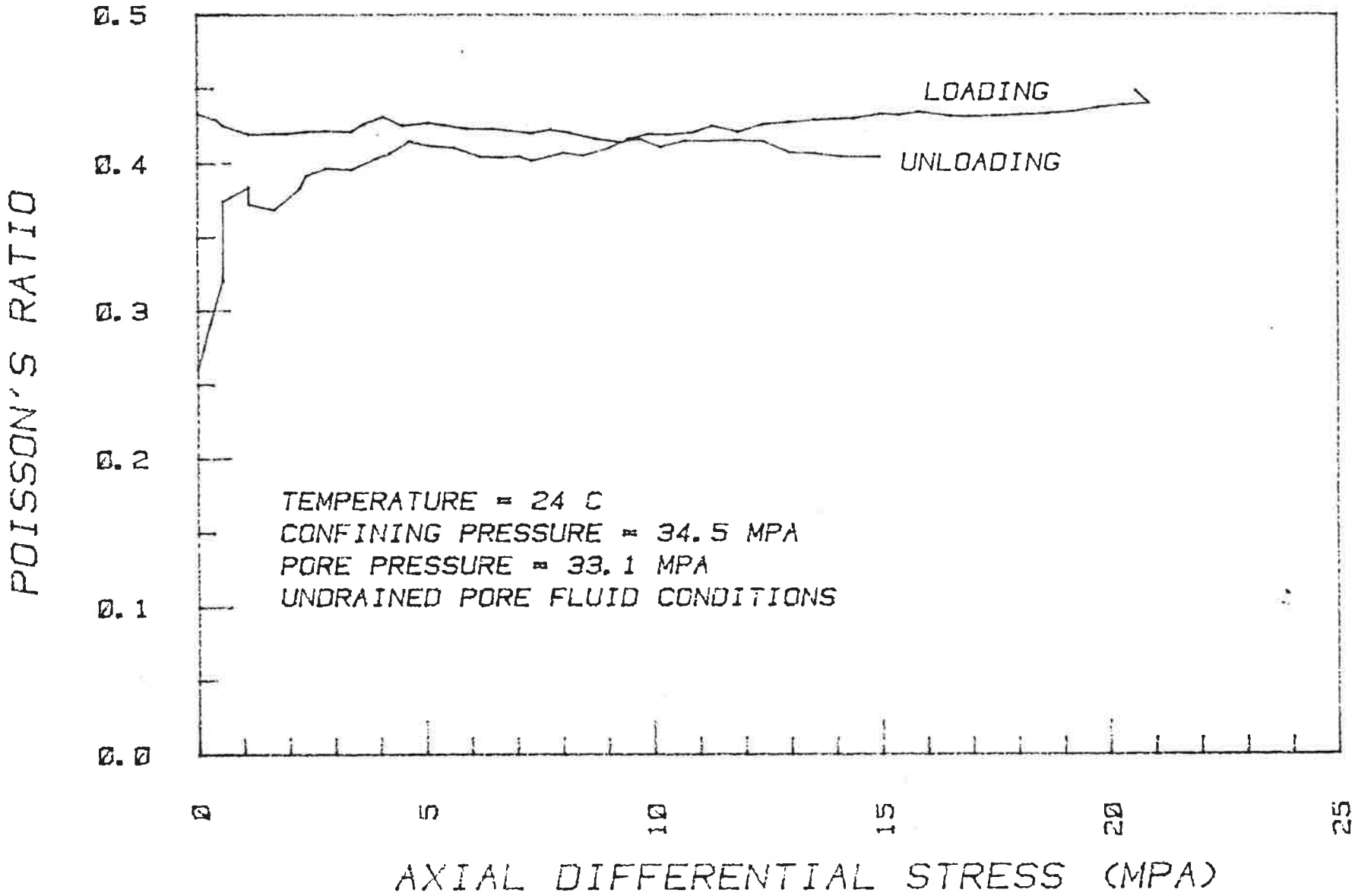
DIFFERENTIAL LOADING



13-AUG-81

EE-2 SAMPLE 13962A

DIFFERENTIAL LOADING



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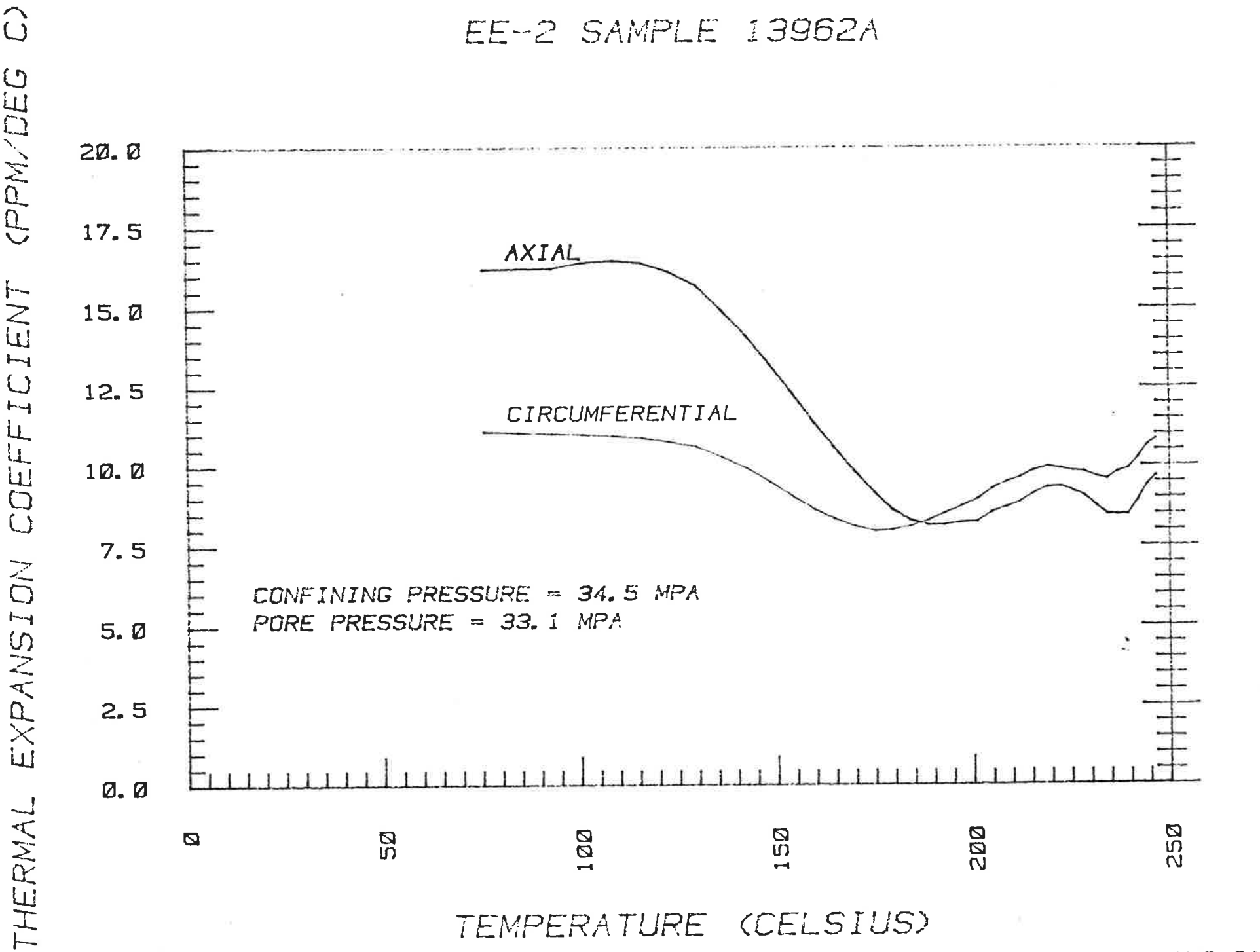
EE-2 SAMPLE 13962A
THERMAL EXPANSION COEFFICIENT (PPM/DEG C)
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
AXIAL
CIRCUMFERENTIAL
CONFINING PRESSURE = 34.5 MPA
PORE PRESSURE = 33.1 MPA
0
50
100
150
200
250
TEMPERATURE (CELSIUS)

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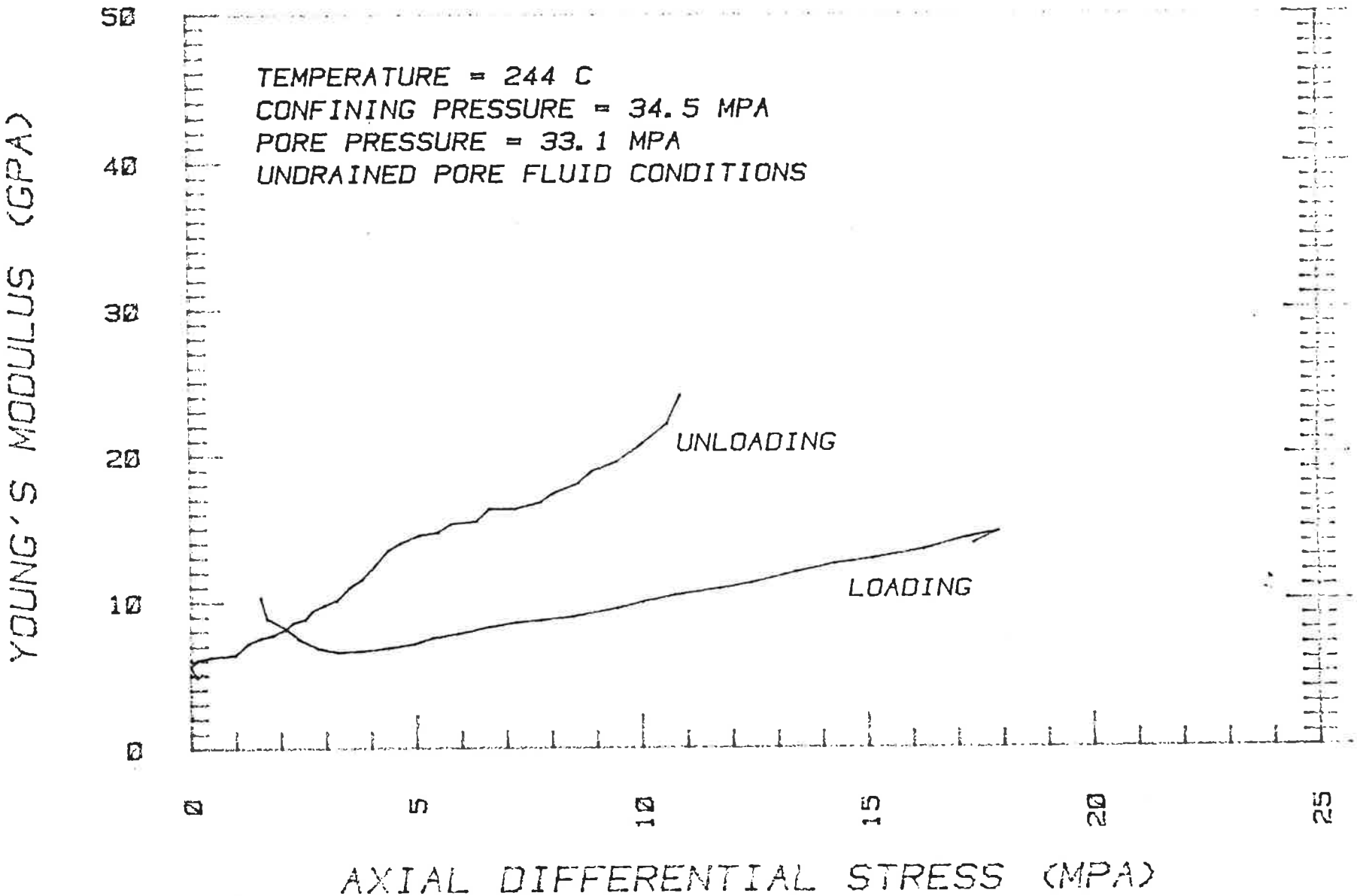
EE-2 SAMPLE 13962A

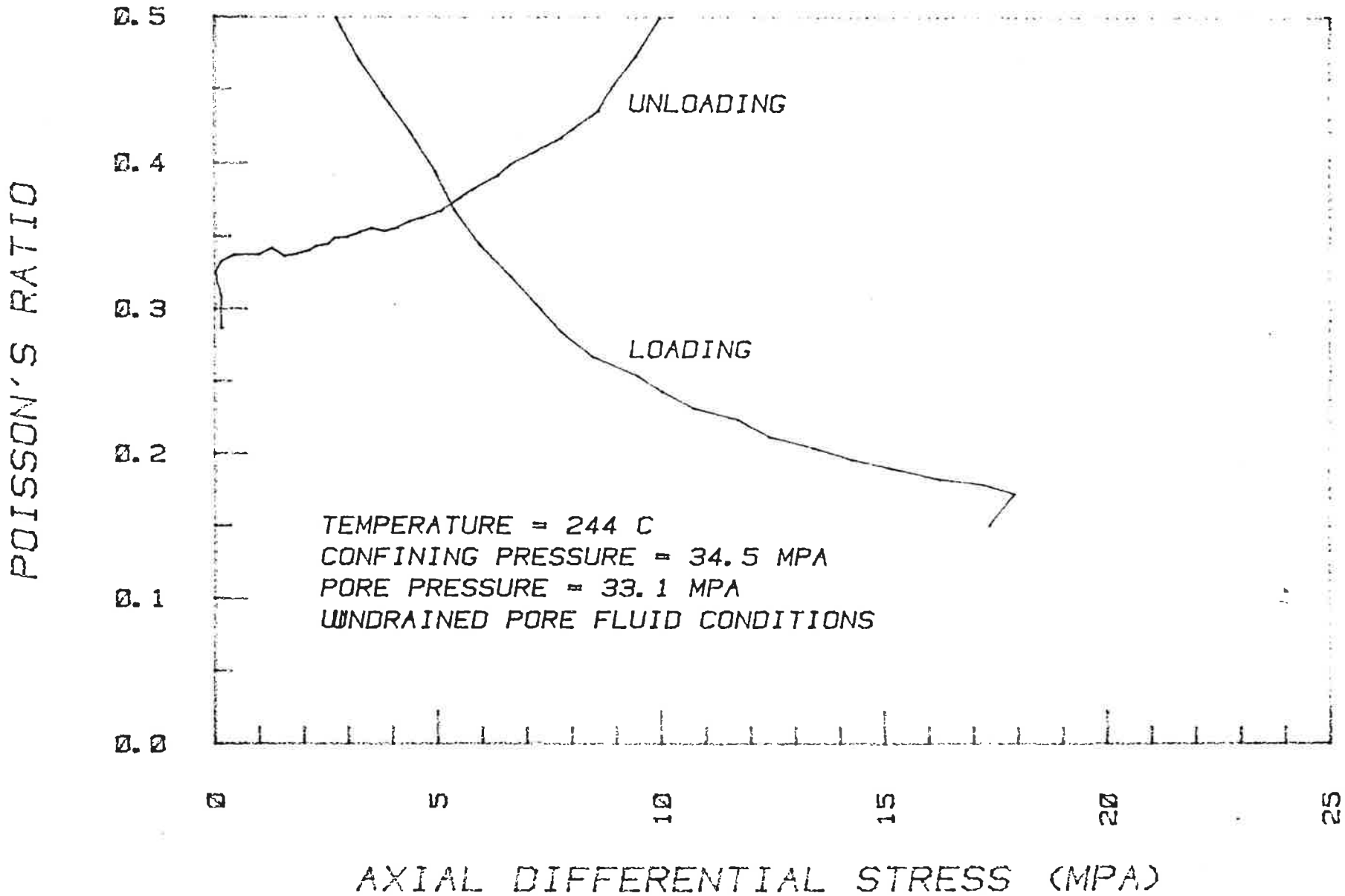
DIFFERENTIAL LOADING RESULTS



13-AUG-81

EE-2 SAMPLE 13962A

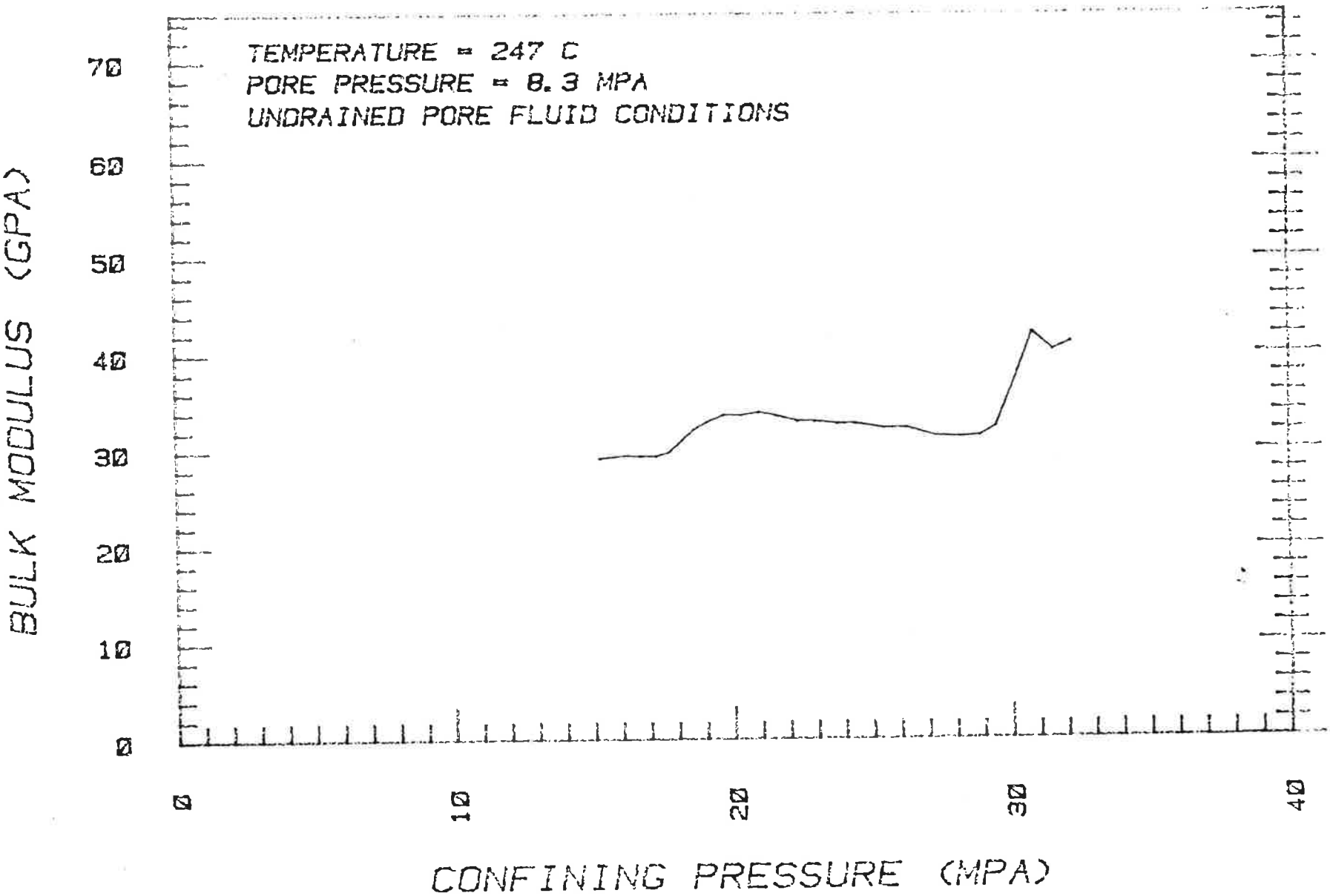
DIFFERENTIAL LOADING RESULTS



13-AUG-81

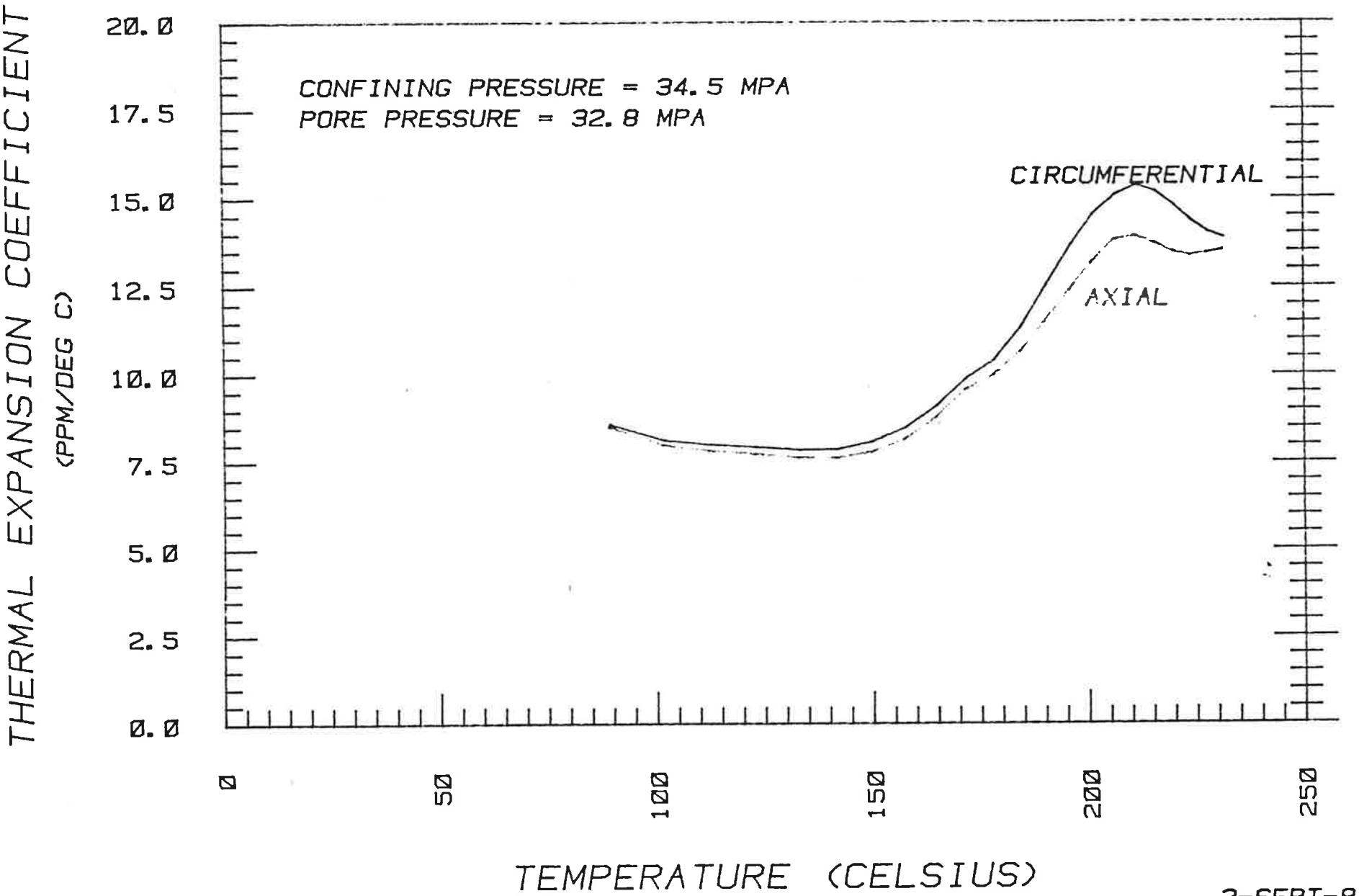
EE-2 SAMPLE 13962A

HYDROSTATIC COMPRESSION



13-AUG-81

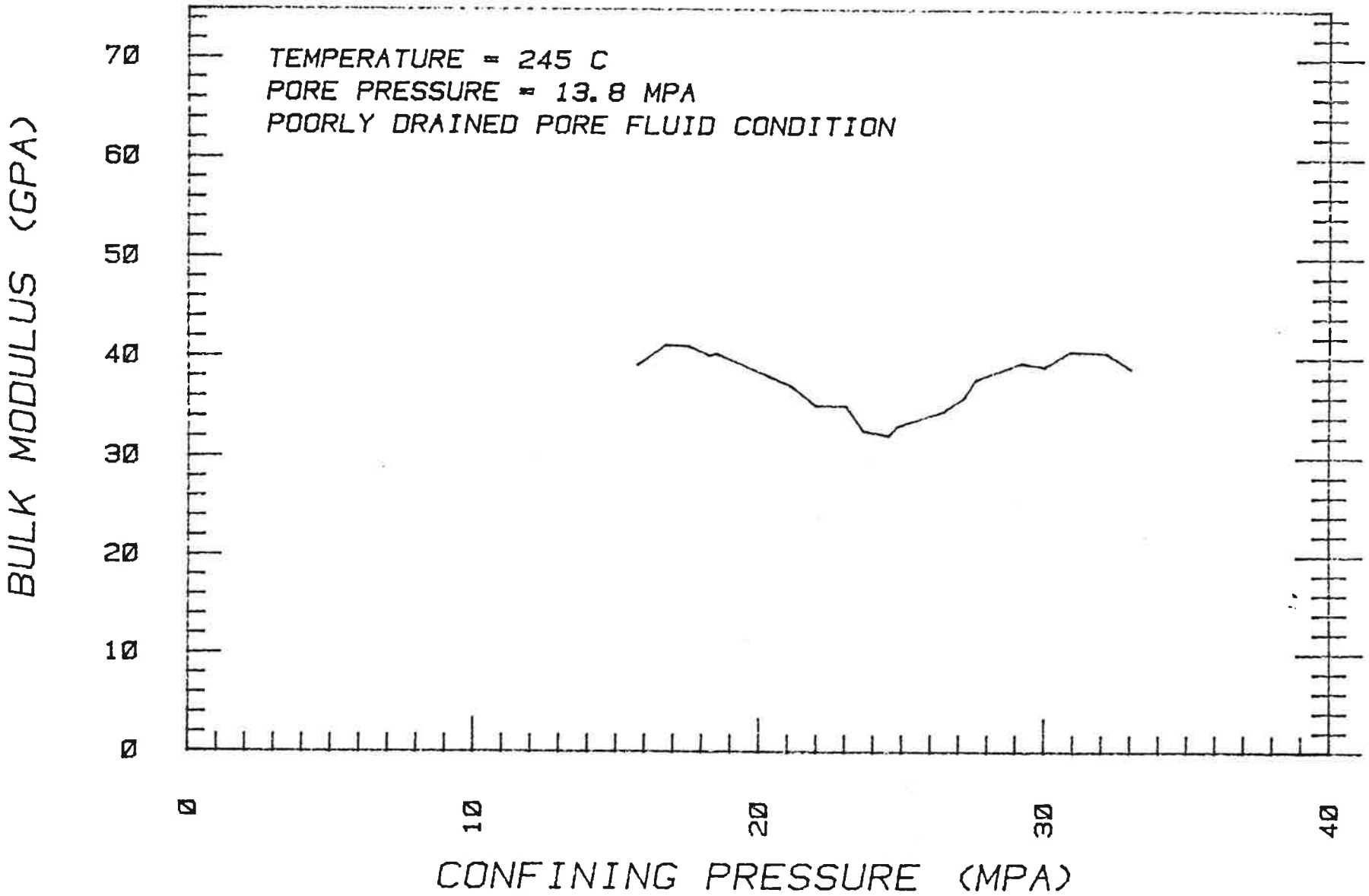
EE-2 SAMPLE 11739A



2-SEPT-81

EE-2 SAMPLE 11739A

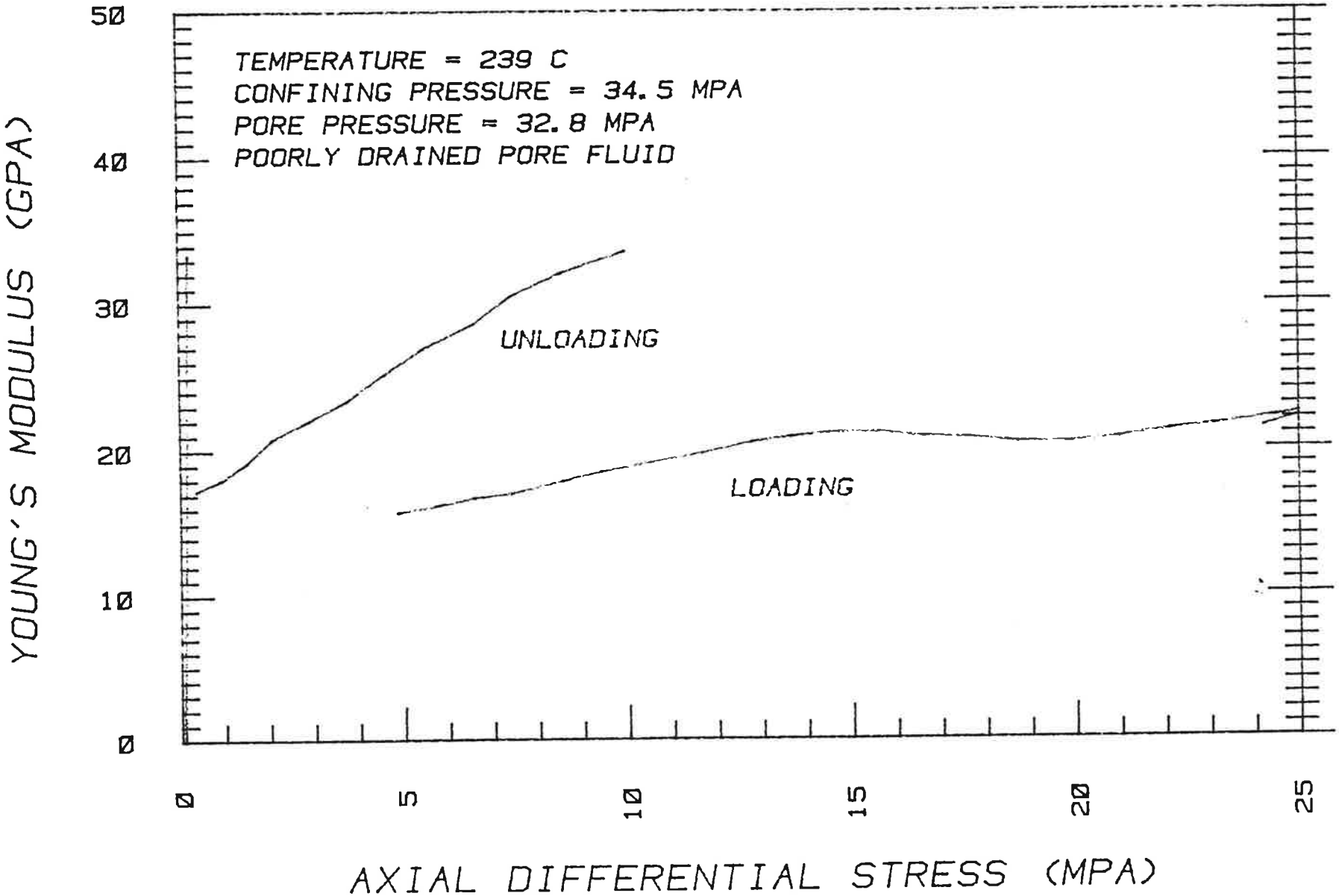
HYDROSTATIC COMPRESSION



2-SEPT-81

EE-2 SAMPLE 11739A

DIFFERENTIAL LOADING RESULTS



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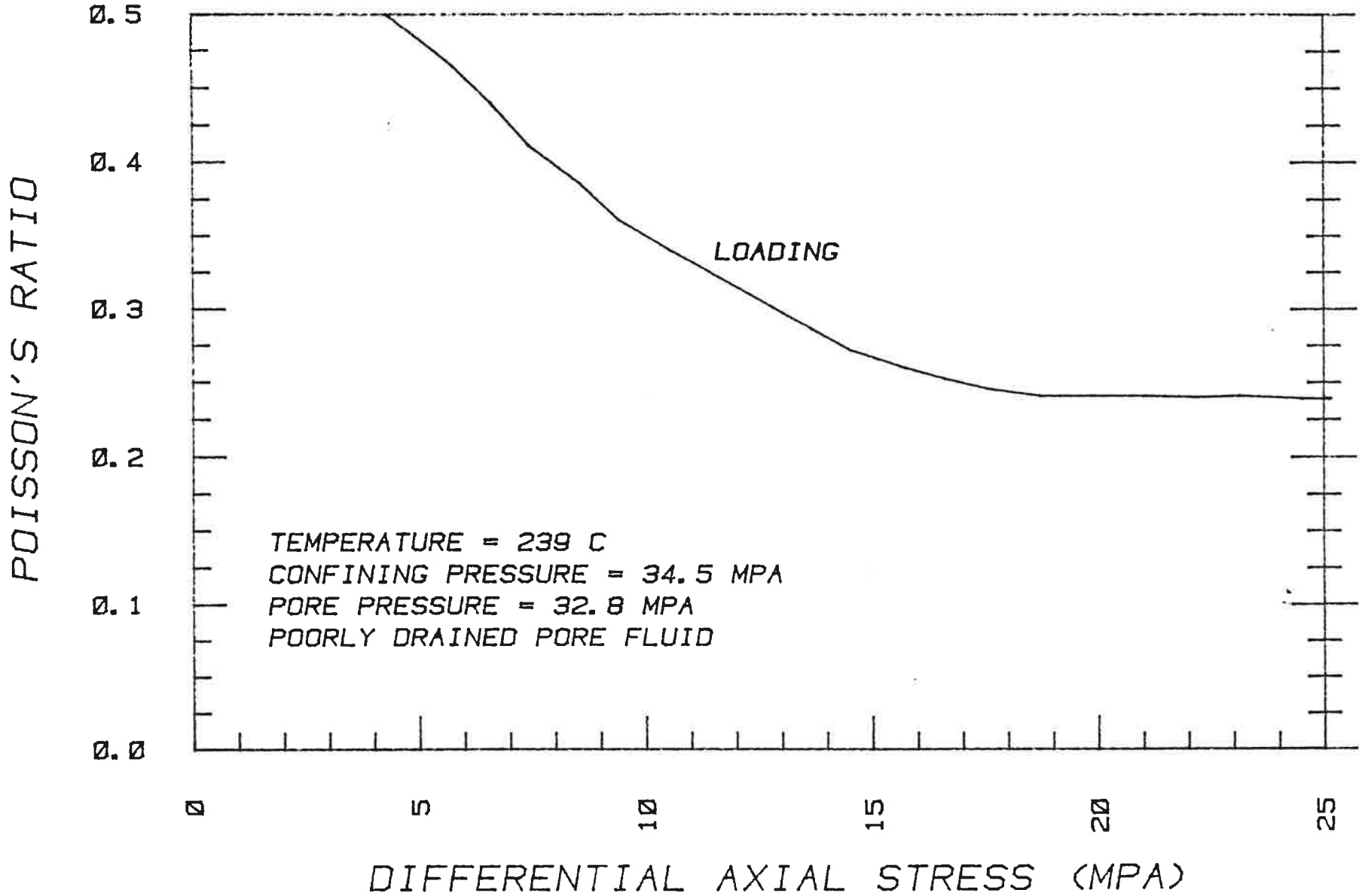
EE-2 SAMPLE 11739A

DIFFERENTIAL LOADING RESULTS



2-SEPT-81