

START



**MICROFILMED BY
NATIONAL SPACE SCIENCE DATA CENTER
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771**

SOIL MECHANICS EXPERIMENT (S-200)

APOLLO 16 - LSRP DATA PACKAGE

MAY, 1972

| <u>SECTION</u> | <u>ITEM</u> | <u>PAGES</u> |
|----------------|-------------------------|---------------|
| (A) | STRESS-PEN. CURVES | A-1 thru A-10 |
| (B) | REDUCED DATA | B-1 thru B-18 |
| (C) | POST-FLIGHT CALIBRATION | C-1 thru C-6 |
| (D) | PRE-FLIGHT CALIBRATION | D-1 thru D-4 |

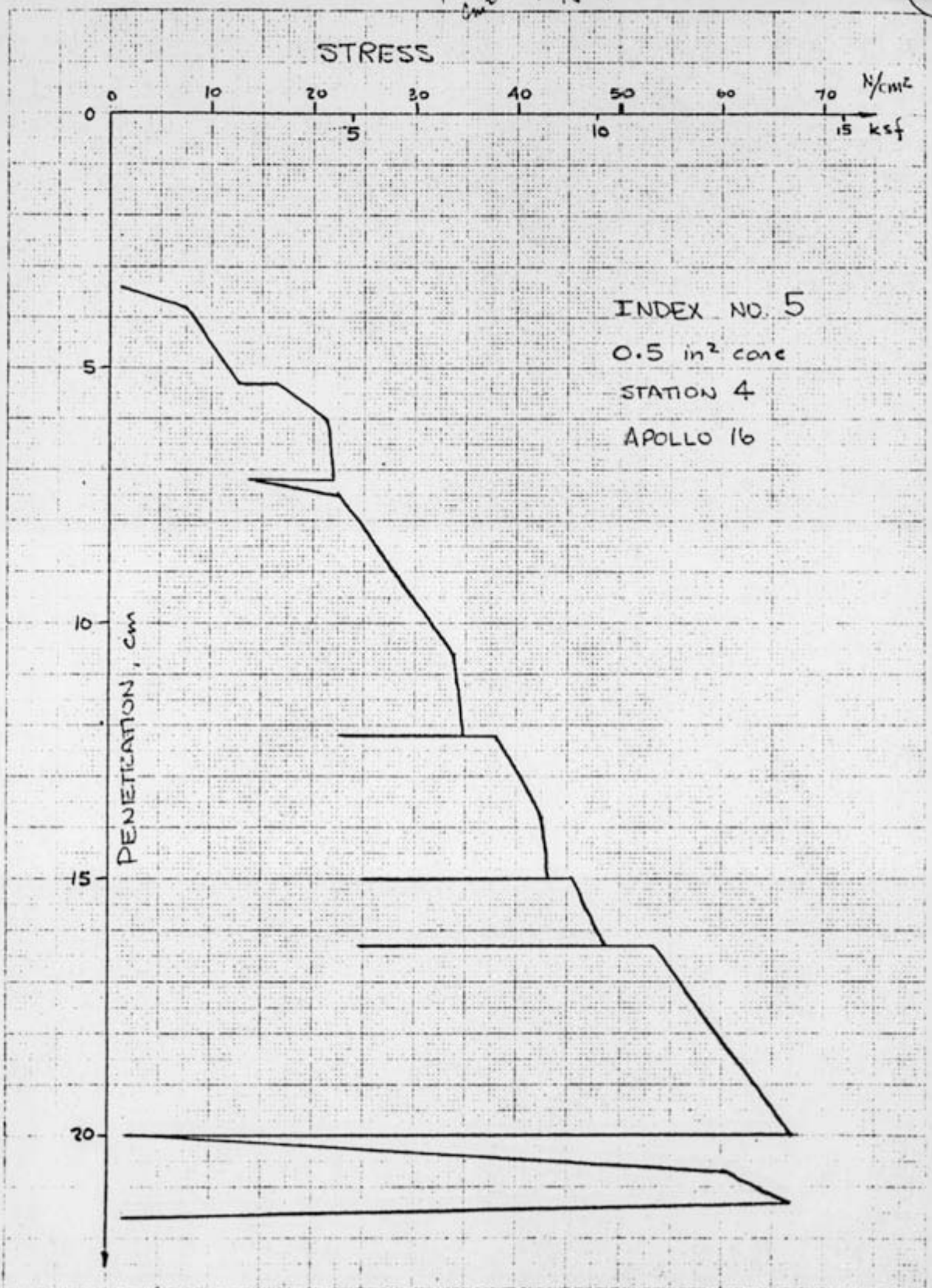
A

APOLLO 16 - LSRP

STRESS-PENETRATION CURVES

$\frac{1}{0.002} = 1.45 \text{ psi}$

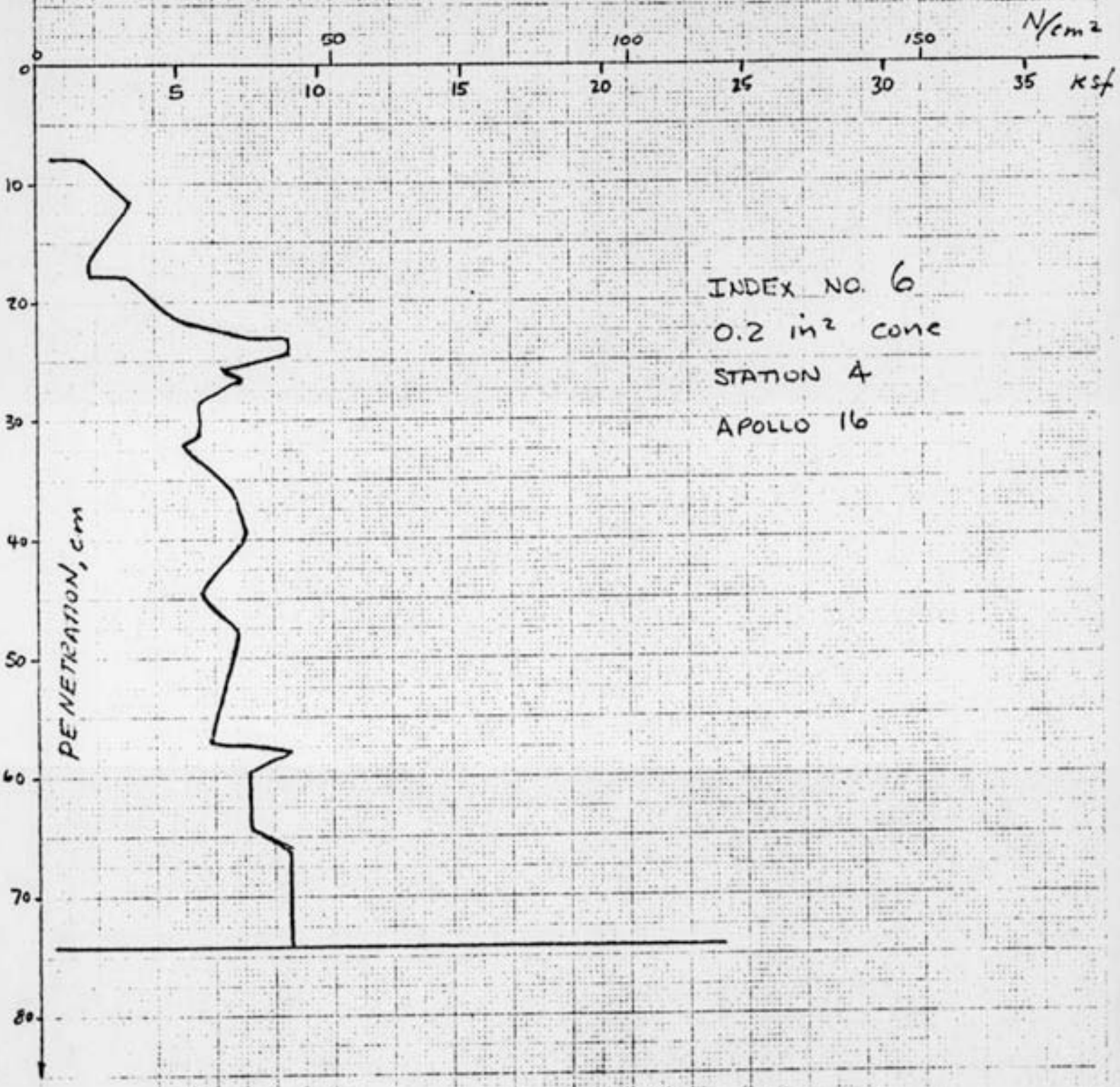
STRESS



INDEX NO. 5
 0.5 in² cone
 STATION 4
 APOLLO 16

REPRODUCED FROM THE ORIGINAL RECORD FOR THE CONTAINER 78 1215

STRESS

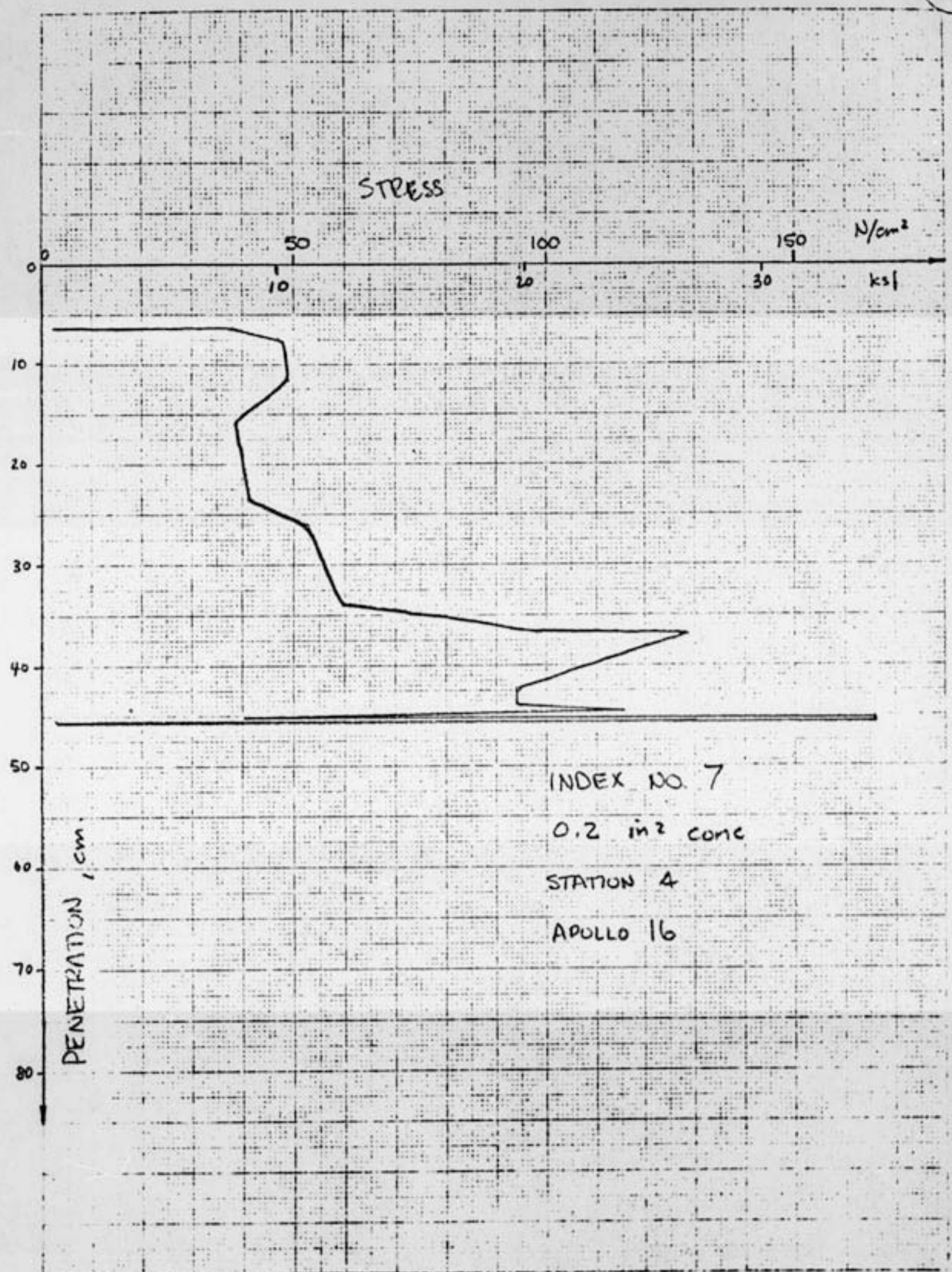


INDEX NO. 6
0.2 in² cone
STATION 4
APOLLO 16

PENETRATION, cm

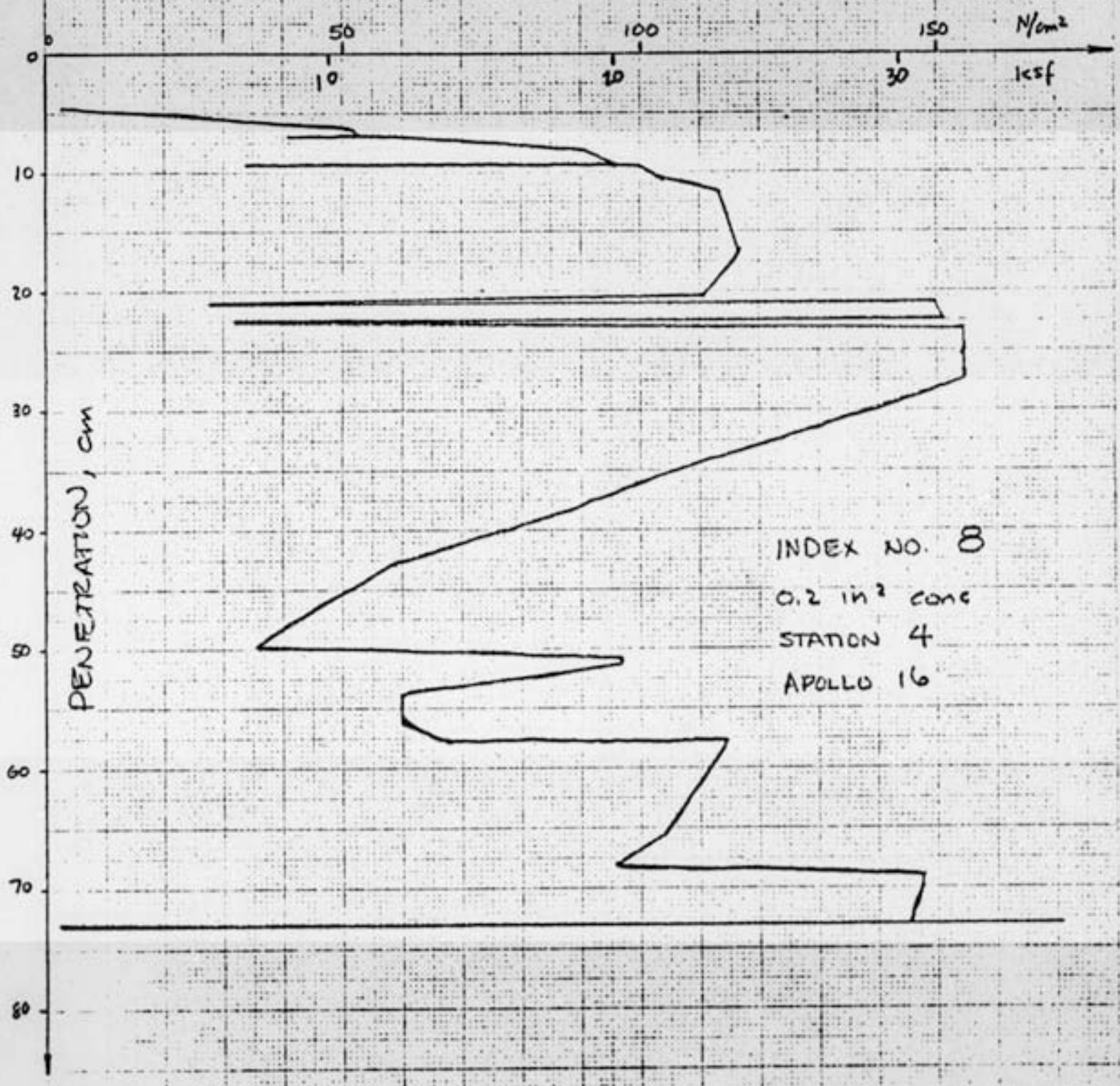
GENERAL PURPOSE CONE
10 X 10 TO THE CENTERLINE
NO. 1215

PERMITS & EQUIP. CO.
10 X 10 TO THE CENTERLINE
NO. 1215



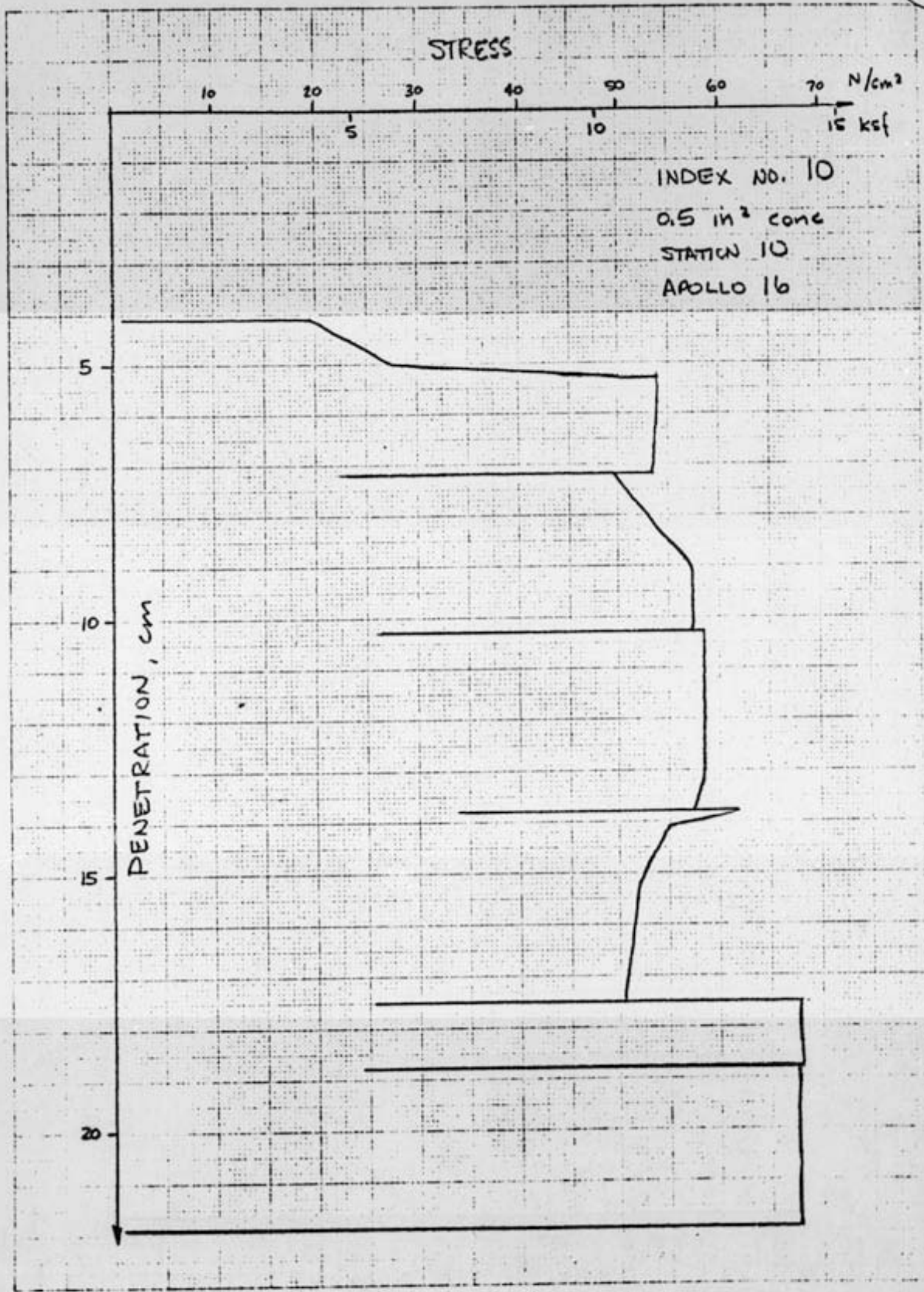
INDEX NO. 7
0.2 in² conc
STATION 4
APOLLO 16

STRESS



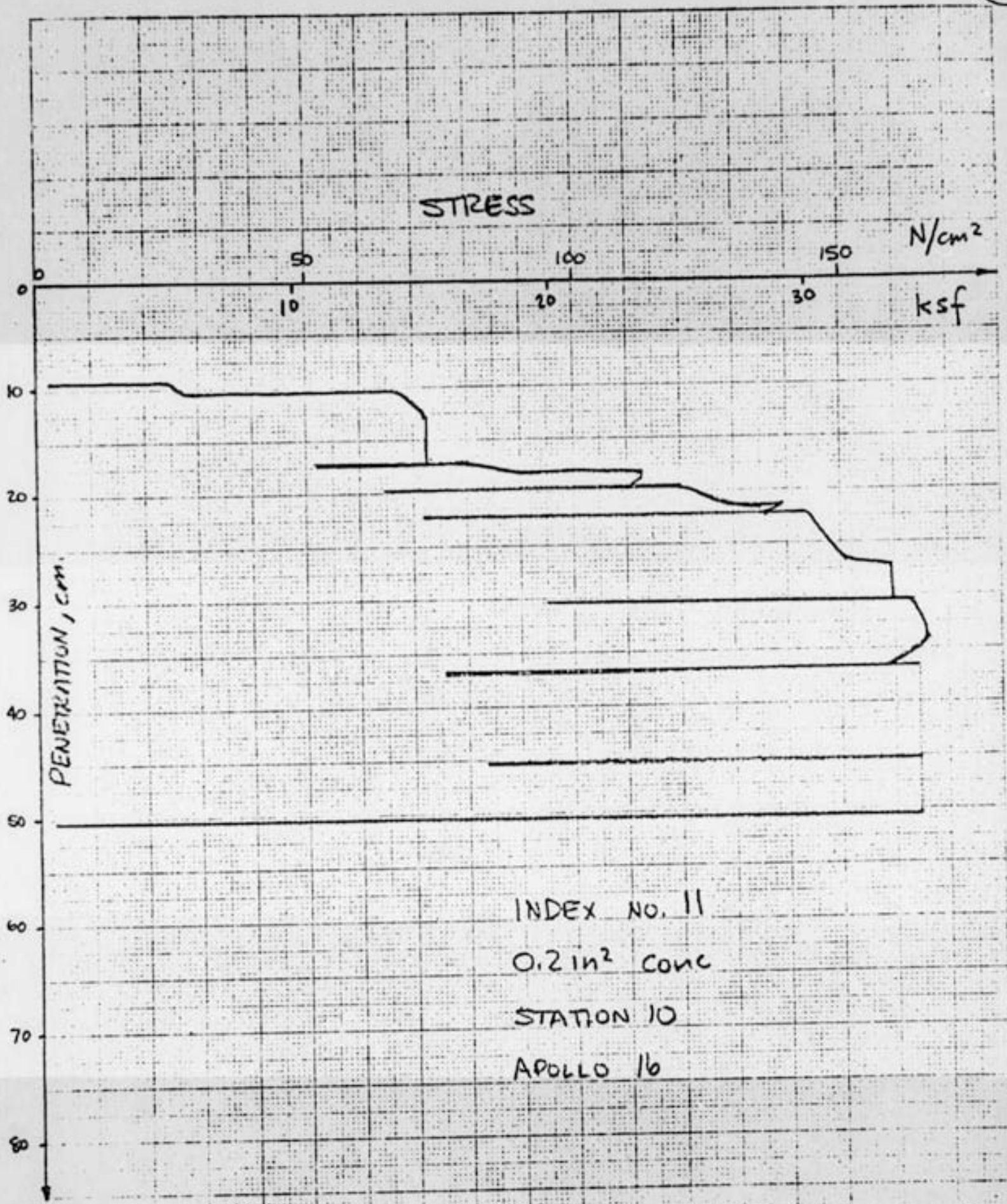
INDEX NO. 8
 0.2 in² conc
 STATION 4
 APOLLO 16

5121 04. BUREAU OF THE CENTER FOR RESEARCH AND DEVELOPMENT
 15115



REPRODUCED FROM THE ORIGINAL REPORT
ASSEMBLED BY THE CENTER FOR SPACE AND AERONAUTICAL ENGINEERING
NO. 1215

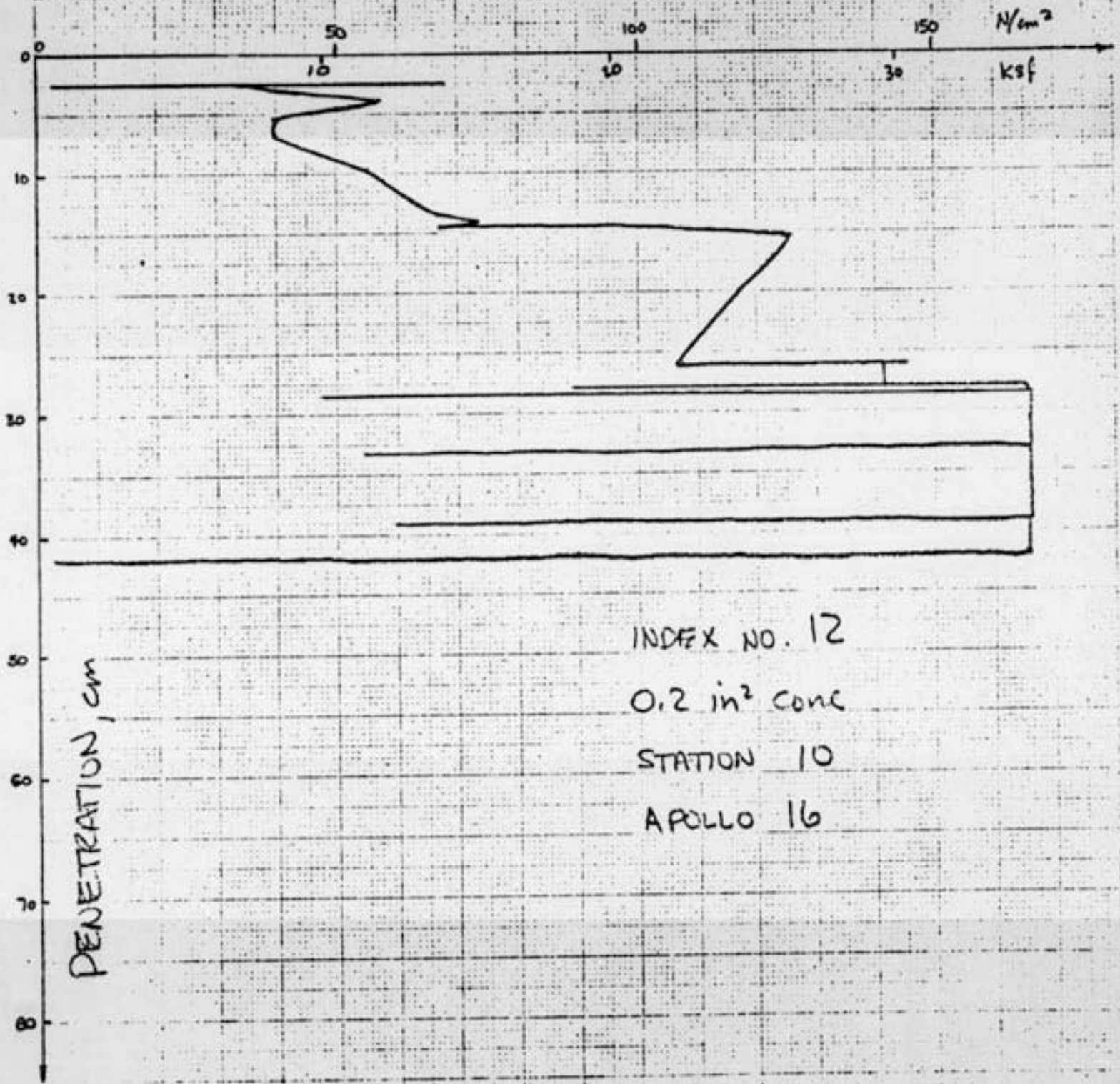
STRESS



INDEX NO. 11
 0.2 in² CONC
 STATION 10
 APOLLO 16

REPRODUCED BY SPACE CO.
 1000 16 X 20 CM
 1000 10 X 10 TO THE CENTIMETERS 40 1215

STRESS



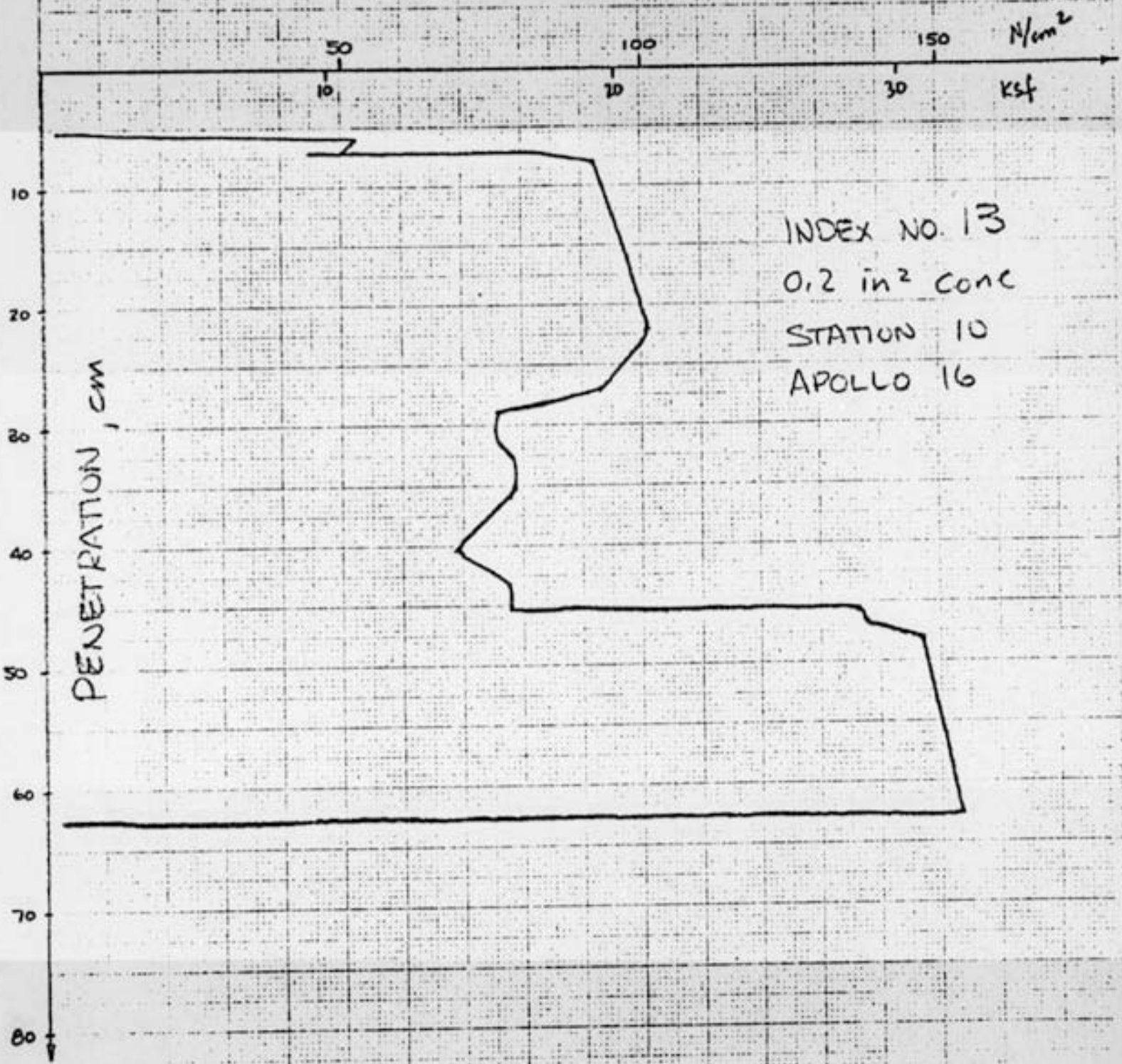
INDEX NO. 12
 0.2 in² CONC
 STATION 10
 APOLLO 16

PENETRATION, cm

APOLLO 16 STATION 10 TO THE CENTRE OF THE PENETRATION

SIZE ON REVERSE SIDE OF X OF 2032
MILWAUKEE PAPER CO.
100 WEST 23RD ST.

STRESS



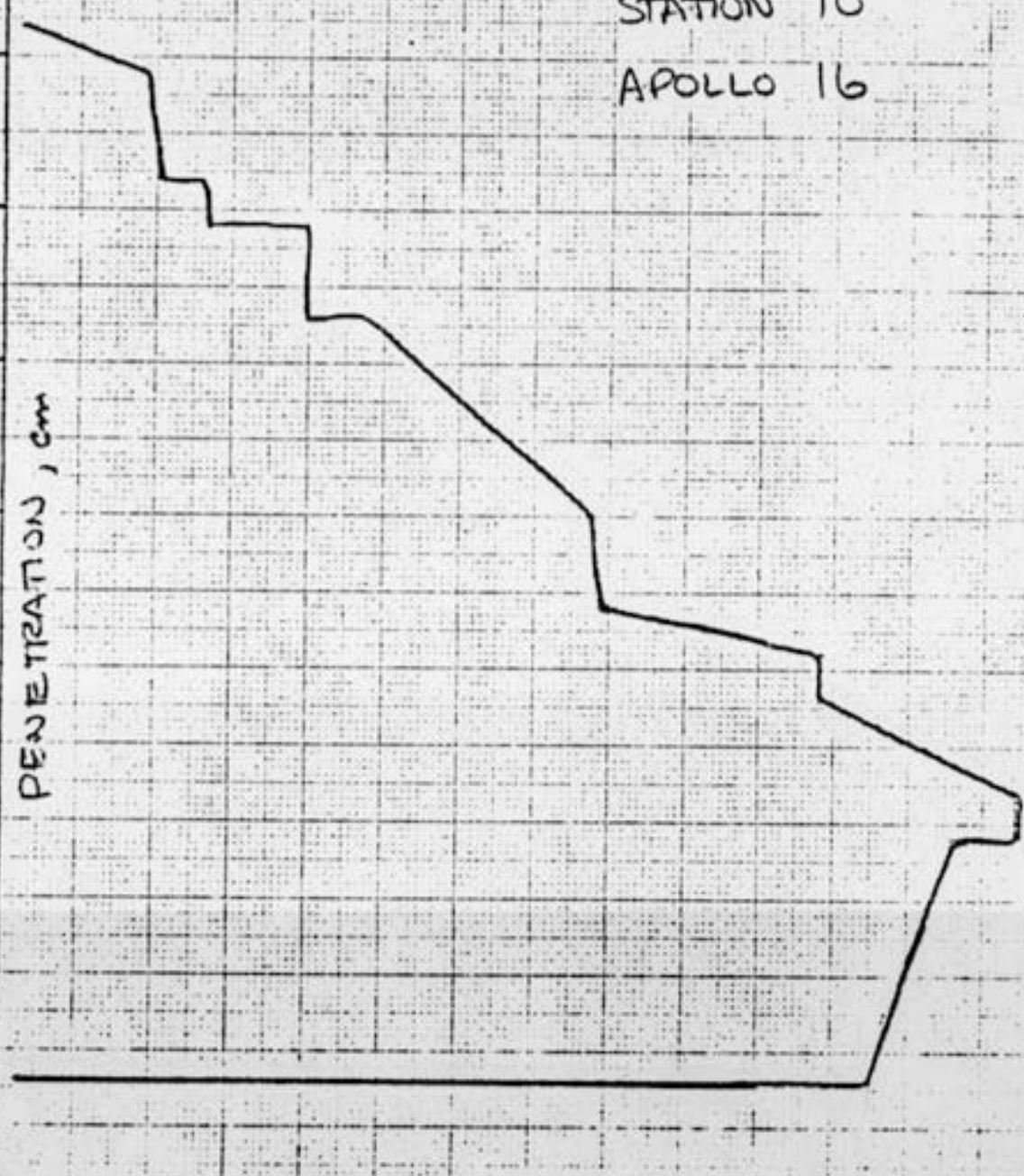
STRESS

0 1 2 3 4 5 6 7 N/cm²
0.5 1.0 1.5 ksf

INDEX NO. 15
1" x 5" PLATE
STATION 10
APOLLO 16

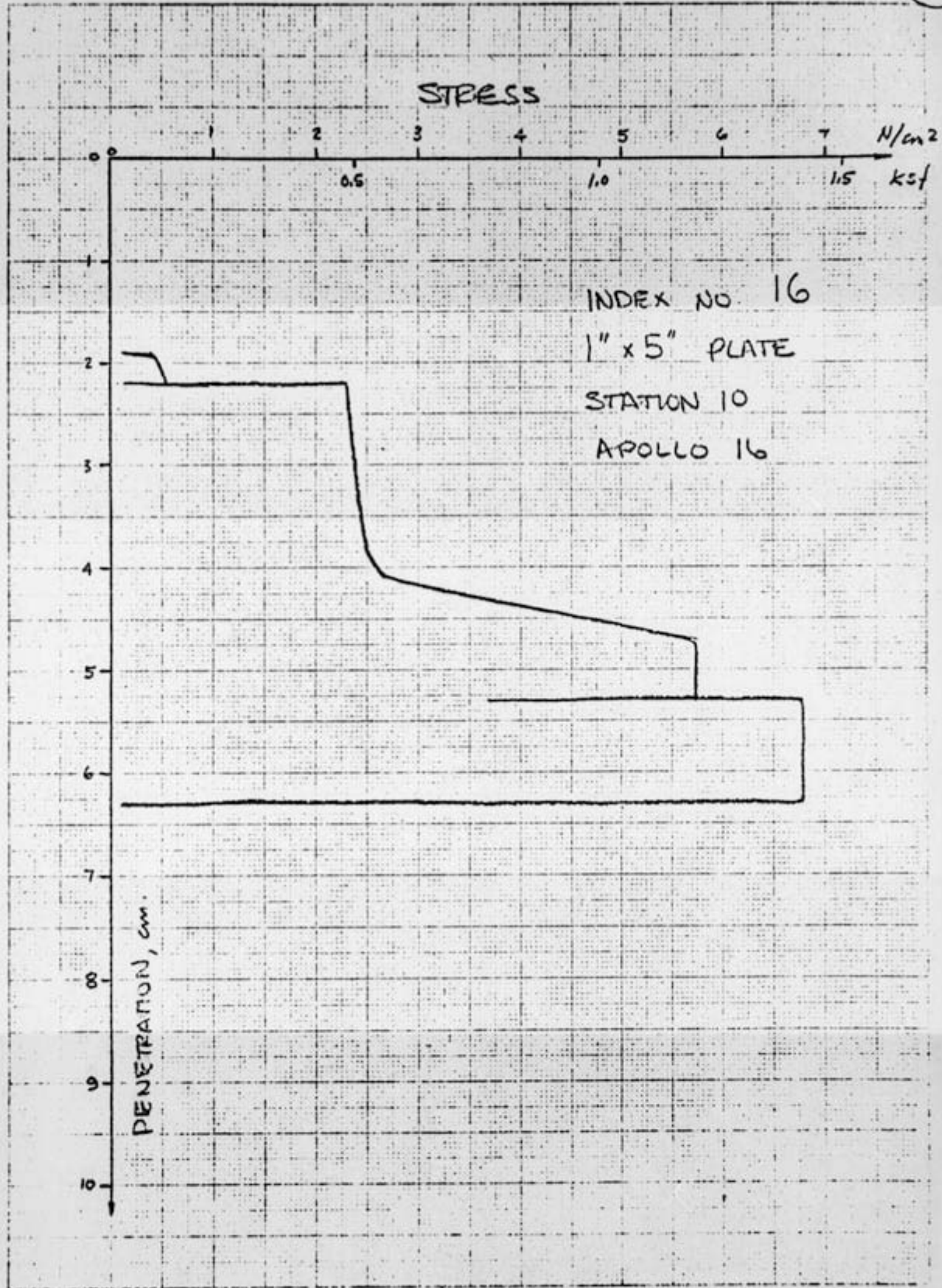
1
2
3
4
5
6
7
8
9
10

PENETRATION, cm



RENTAL & FERRY CO.
10 X 10 TO THE CENTERLINE
40 INIS

1.5 X 10 X 10 TO THE CENTIMETER 40 1215
GENERAL & SPECIAL



(B)

APOLLO 16 - LSRP

REDUCED DATA

CALIBRATIONS FOR APOLLO 16 DATA REDUCTION

PENETRATION

based on pre- and post-flight calibration
use ratio $\frac{\text{actual}}{\text{recorded}} = 31.3$

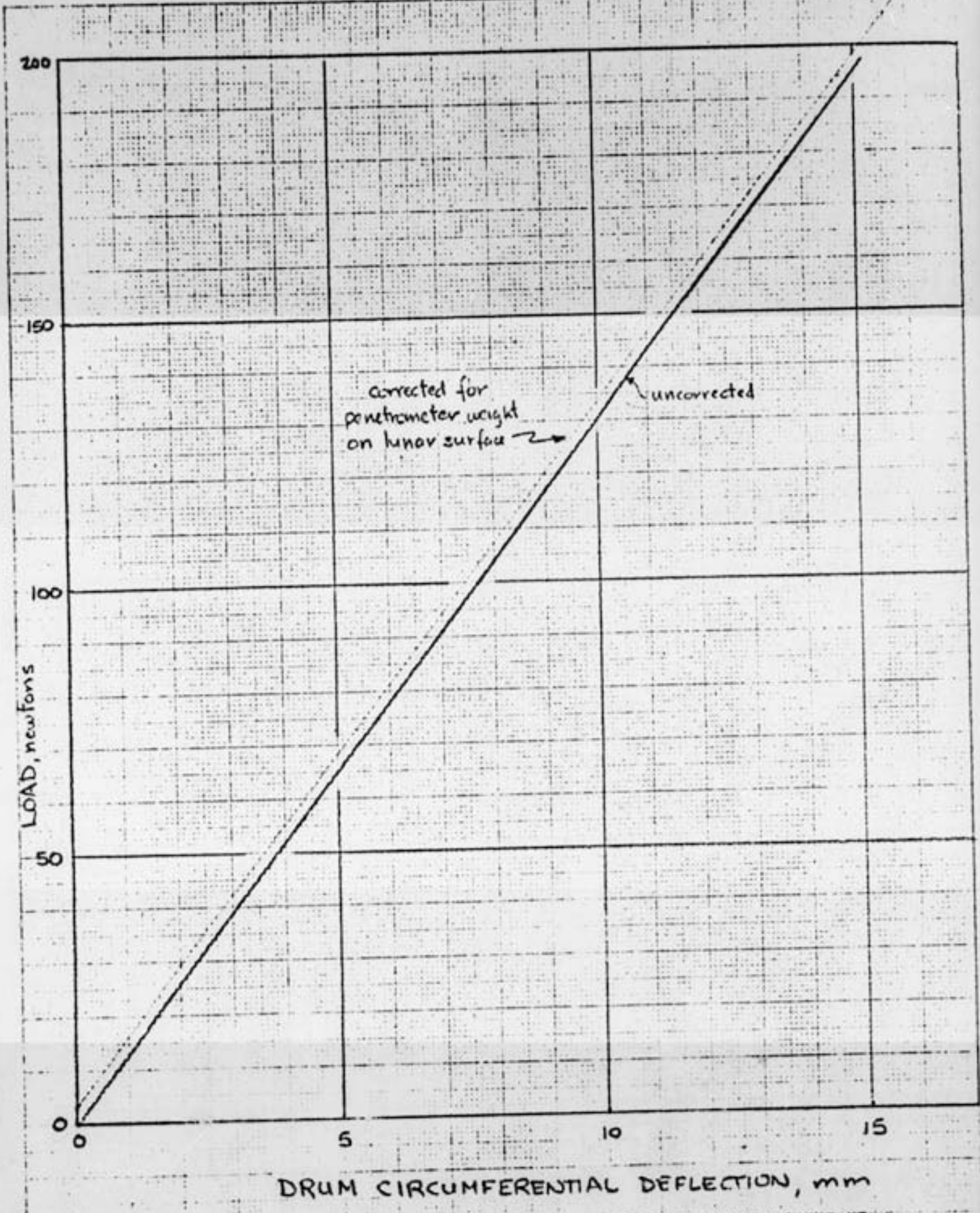
LOAD

penetrometer used w/o handle on moon

| | | |
|----------|----------|----------|
| weight = | on earth | on moon |
| | 4.70 lbs | ⋮ |
| | 2.132 kg | ⋮ |
| | 20.914 N | 3.4857 N |

∴ — use 3.49 N addition to calibration curve
on next page —

B-2



LOAD, newtons

DRUM CIRCUMFERENTIAL DEFLECTION, mm

APOLLO 16 LOAD CALIBRATION CURVE

REPRODUCED FROM THE ORIGINAL RECORDS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

DOT

APOLLO 16

(B-3)

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12

MAY 1972

FLIGHT UNIT (S/N 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (S/N 2008)

Index No. 5 Page No. 1

0.5 in² conc. = 3.2758 cm²

| DRUM LOAD ϕ | DRUM LOAD ϕ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | \rightarrow 31.3 | |
|---------------------|---------------------|-------------------|------------------------|-----------------------------|----------------------------------------|------------------------------------------|------------------------|
| deg-min | degrees | DEFLECTION mm. | (from calib. curve) | newtons/ cm ² | MINOR DRUM DEPTH cm | Δ DRUM DEPTH READING cm. | ACTUAL DEPTH cm. |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | 89.77 | 0.00 | 0.00 |
| 0°00' | 0.00 | 0.00 [*] | 3.5 | 1.1 | 89.86 | 0.11 | 3.4 |
| 2°50' | 2.83 | 1.57 | 23.8 | 7.4 | 89.89 | 0.12 | 3.8 |
| 5°14' | 5.23 | 2.90 | 41.0 | 12.7 | 89.94 | 0.17 | 5.3 |
| 6°55' | 6.92 | 3.84 | 53.0 | 16.4 | 89.94 | 0.17 | 5.3 |
| 9°05' | 9.08 | 5.03 | 68.7 | 21.3 | 89.94 | 0.19 | 6.0 |
| 9°20' | 9.33 | 5.17 | 70.3 | 21.8 | 90.00 | 0.23 | 7.2 |
| 5°40' | 5.67 | 3.14 | 44.0 | 13.6 | 90.00 | 0.23 | 7.2 |
| 9°41' | 9.68 | 5.36 | 72.8 | 22.6 | 90.01 | 0.24 | 7.5 |
| 14°38' | 14.63 | 8.11 | 109.0 | 33.8 | 90.11 | 0.34 | 10.6 |
| 15°02' | 15.03 | 8.33 | 111.7 | 34.6 | 90.16 | 0.39 | 12.2 |
| 9°38' | 9.63 | 5.34 | 72.6 | 22.5 | 90.16 | 0.39 | 12.2 |
| 16°35' | 16.52 | 9.19 | 122.7 | 38.0 | 90.16 | 0.39 | 12.2 |
| 18°33' | 18.55 | 10.28 | 137.0 | 42.5 | 90.21 | 0.44 | 13.8 |
| 18°49' | 18.72 | 10.43 | 137.8 | 43.0 | 90.25 | 0.48 | 15.0 |
| 8°49' | 8.72 | 4.73 | 67.0 | 19.8 | 90.25 | 0.48 | 15.0 |
| 20°00' | 20.00 | 10.8 | 147.3 | 45.7 | 90.25 | 0.48 | 15.0 |
| 21°19' | 21.32 | 11.82 | 157.0 | 48.7 | 90.25 | 0.52 | 16.3 |
| 8°15' | 8.25 | 4.57 | 62.5 | 19.4 | 90.25 | 0.52 | 16.3 |
| 23°24' | 23.40 | 12.97 | 172.0 | 53.3 | 90.29 | 0.52 | 16.3 |

APOLLO 16

(B-5)

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (SN 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (SN 2008)

Index No. 3 Page No. 1

0.2 in² conc = 1.2903 cm²

| | $\times 5912$ | \downarrow | | | | $\rightarrow \times 31.3$ | \downarrow | |
|------------------------|------------------------|-------------------|------------------------|-----------------------------|-------|---------------------------|-----------------|--|
| DRUM LOAD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | Δ DRUM DEPTH | ACTUAL DEPTH | |
| deg-min | degrees | DEFLECTION mm. | (from calib. curve) | newtons/ cm ² | | READING cm. | DEPTH cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | 99.76 | 0.00 | 0.00 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | 99.03 | 0.25 | 7.8 | |
| 2°08' | 2.13 | 1.18 | 17.3 | 14.2 | 99.03 | 0.25 | 7.8 | |
| 2°25' | 2.42 | 1.34 | 20.6 | 16.0 | 99.15 | 0.37 | 11.6 | |
| 1°08' | 1.13 | 0.63 | 11.5 | 8.9 | 99.31 | 0.53 | 16.6 | |
| 1°08' | 1.13 | 0.63 | 11.5 | 8.9 | 99.35 | 0.57 | 17.8 | |
| 2°13' | 2.22 | 1.23 | 19.5 | 15.1 | 99.35 | 0.57 | 17.8 | |
| 3°39' | 3.65 | 2.02 | 29.5 | 22.9 | 99.46 | 0.68 | 21.3 | |
| 6°15' | 6.25 | 3.46 | 48.3 | 37.4 | 99.53 | 0.74 | 23.2 | |
| 7°12' | 7.20 | 3.99 | 55.1 | 42.7 | 99.53 | 0.74 | 23.2 | |
| 7°12' | 7.20 | 3.99 | 55.1 | 42.7 | 99.57 | 0.79 | 24.7 | |
| 5°09' | 5.15 | 2.85 | 40.4 | 31.3 | 99.60 | 0.82 | 25.6 | |
| 5°46' | 5.77 | 3.20 | 45.0 | 34.9 | 99.63 | 0.85 | 26.6 | |
| 4°26' | 4.43 | 2.46 | 35.5 | 27.5 | 99.63 | 0.91 | 28.5 | |
| 4°26' | 4.43 | 2.46 | 35.5 | 27.5 | 99.75 | 1.00 | 31.3 | |
| 3°56' | 3.93 | 2.18 | 31.8 | 24.6 | 99.80 | 1.02 | 32.0 | |
| 5°25' | 5.42 | 3.00 | 42.5 | 32.9 | 99.92 | 1.14 | 35.7 | |
| 5°52' | 5.87 | 3.25 | 45.8 | 35.5 | 99.94 | 1.26 | 39.4 | |
| 4°29' | 4.48 | 2.48 | 35.8 | 27.7 | 99.20 | 1.42 | 44.5 | |
| 5°37' | 5.62 | 3.11 | 43.9 | 34.0 | 99.30 | 1.52 | 47.6 | |

APOLLO 16

B-7

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (% 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (% 2008)

Index No. 7 Page No. 1

0.2 in² cone

| | ↗ x.5542 | ↘ | | | | | ↗ x 31.3 | ↘ | |
|---------------|----------------|------------------|-----------------------|------------------------|--|----------------|-----------------|-----------------|--|
| DRUM LMD & | DRUM LOAD & | DRUM CIRCUMF. | LOAD Newtons | STRESS | | MINOR DEPTH | Δ DRUM DEPTH | ACTUAL DEPTH | |
| deg-min | degrees | DEFLECTON mm. | (from calib. cone) | newton/cm ² | | mm | READING cm. | DEPTH cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | | 89.78 | 0.00 | 0.0 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 89.90 | 0.20 | 6.3 | |
| 6°14' | 6.23 | 3.45 | 48.4 | 37.5 | | 89.90 | 0.20 | 6.3 | |
| 8°05' | 7.08 | 4.48 | 61.7 | 47.8 | | 90.03 | 0.25 | 7.8 | |
| 8°17' | 8.28 | 4.59 | 63.2 | 49.0 | | 90.15 | 0.37 | 11.6 | |
| 6°28' | 6.47 | 3.59 | 50.2 | 38.9 | | 90.25 | 0.50 | 15.7 | |
| 6°52' | 6.87 | 3.81 | 53.0 | 41.1 | | 90.53 | 0.75 | 23.5 | |
| 8°57' | 8.95 | 4.96 | 68.0 | 52.7 | | 90.61 | 0.83 | 26.0 | |
| 9°15' | 9.25 | 5.13 | 70.2 | 54.4 | | 90.87 | 1.09 | 34.1 | |
| 13°26' | 13.43 | 7.44 | 100.2 | 77.7 | | 90.90 | 1.12 | 35.1 | |
| 16°59' | 16.98 | 9.41 | 125.8 | 97.5 | | 90.95 | 1.17 | 36.6 | |
| 22°32' | 22.53 | 12.49 | 165.8 | 128.5 | | 90.96 | 1.18 | 36.9 | |
| 16°21' | 16.35 | 9.06 | 121.3 | 94.0 | | 91.13 | 1.35 | 42.3 | |
| 16°21' | 16.35 | 9.06 | 121.3 | 94.0 | | 91.15 | 1.40 | 43.8 | |
| 20°07' | 20.12 | 11.15 | 148.5 | 115.1 | | 91.20 | 1.42 | 44.5 | |
| 6°45' | 6.75 | 3.74 | 52.1 | 40.4 | | 91.23 | 1.44 | 45.1 | |
| 29°25' | 29.42 | 16.30 | 215.4 | 166.9 | | 91.23 | 1.44 | 45.1 | |
| 29°25' | 29.42 | 16.30 | 215.4 | 166.9 | | 91.23 | 1.45 | 45.4 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 91.25 | 1.45 | 45.4 | |

APOLLO 16

B-8

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (SN 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (SN 2008)

Index No. 3 Page No. 1

0.2 in² cone

| | 17 x .5542 | ↓ | | | | ↑ x 31.3 | ↓ | |
|---------------|----------------|-------------------|------------------------|-----------------------------|--|-----------------|-----------------|------|
| DRUM LMD & | DRUM LOAD & | DRUM CIRCUMF. | LOAD Newtons | STRESS | | Δ DRUM DEPTH | ACTUAL DEPTH | |
| deg-min | degrees | DEFLECTION mm. | (from calib. curve) | newtons/ cm ² | | READING cm. | DEPTH cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | | 89.75 | 0.00 | 0.00 |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 89.95 | 0.15 | 4.7 |
| 4°05' | 4.08 | 2.21 | 32.2 | 25.0 | | 89.95 | 0.17 | 5.3 |
| 8°50' | 8.83 | 4.77 | 65.6 | 50.8 | | 89.95 | 0.20 | 6.3 |
| 9°10' | 9.17 | 4.97 | 68.1 | 52.8 | | 90.01 | 0.22 | 6.9 |
| 6°57' | 6.95 | 3.77 | 52.5 | 40.7 | | 90.01 | 0.22 | 6.9 |
| 10°31' | 10.52 | 5.71 | 77.7 | 60.2 | | 90.01 | 0.22 | 6.9 |
| 16°03' | 16.05 | 8.70 | 116.6 | 90.4 | | 90.04 | 0.26 | 8.1 |
| 17°02' | 17.03 | 9.24 | 123.6 | 95.8 | | 90.05 | 0.30 | 9.4 |
| 5°39' | 5.65 | 3.06 | 43.3 | 33.6 | | 90.05 | 0.30 | 9.4 |
| 17°45' | 17.75 | 9.63 | 128.7 | 99.7 | | 90.05 | 0.30 | 9.4 |
| 18°33' | 18.55 | 10.05 | 134.2 | 104.0 | | 90.12 | 0.24 | 10.6 |
| 20°17' | 20.28 | 10.99 | 146.4 | 113.5 | | 90.15 | 0.37 | 11.6 |
| 20°50' | 20.83 | 11.31 | 150.5 | 116.6 | | 90.31 | 0.53 | 16.6 |
| 19°45' | 19.75 | 10.70 | 142.6 | 110.5 | | 90.45 | 0.65 | 20.4 |
| 4°34' | 4.57 | 2.48 | 35.7 | 27.7 | | 90.45 | 0.67 | 21.0 |
| 26°59' | 26.98 | 14.61 | 193.4 | 149.9 | | 90.45 | 0.67 | 21.0 |
| 27°12' | 27.20 | 14.74 | 195.1 | 151.2 | | 90.51 | 0.72 | 22.5 |
| 5°22' | 5.37 | 2.91 | 41.3 | 32.0 | | 90.51 | 0.72 | 22.5 |
| 27°52' | 27.87 | 15.11 | 199.9 | 154.9 | | 90.51 | 0.74 | 23.2 |

APOLLO 16

(B-9)

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12

MAY 1972

FLIGHT UNIT (5/12004)

Lunar Penetration Data Reduction

LUNAR DRUM (5/12008)

Index No. 8 Page No. 2

0.2 in² cone

| | $\rho \times 5542$ | | | | | | $\rho \times 31.3$ | |
|------------------------|------------------------|-------------------|-----------------------|------------------------|--|------------------|------------------------|-----------------|
| DRUM LOAD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | INITIAL DEPTH | Δ DRUM DEPTH | ACTUAL DEPTH |
| deg-min | degrees | DEFLECTION mm. | (from calib. cone) | newton/cm ² | | Final cm | READING cm. | DEPTH cm. |
| 27°52' | 27.87 | 15.11 | 199.9 | 154.9 | | 90.65 | 0.87 | 27.2 |
| 17°38' | 17.63 | 9.57 | 127.9 | 99.1 | | 90.95 | 1.15 | 36.0 |
| 16°13' | 16.22 | 8.80 | 117.9 | 91.4 | | 90.92 | 1.21 | 37.9 |
| 10°15' | 10.25 | 5.56 | 75.8 | 58.7 | | 91.15 | 1.37 | 42.9 |
| 5°49' | 5.82 | 3.22 | 45.4 | 35.2 | | 91.37 | 1.59 | 49.8 |
| 16°50' | 16.83 | 9.32 | 124.7 | 96.6 | | 91.40 | 1.62 | 50.7 |
| 16°50' | 16.83 | 9.32 | 124.7 | 96.6 | | 91.42 | 1.64 | 51.3 |
| 10°16' | 10.27 | 5.68 | 77.3 | 59.9 | | 91.50 | 1.72 | 53.8 |
| 10°16' | 10.27 | 5.68 | 77.3 | 59.9 | | 91.50 | 1.80 | 56.3 |
| 11°21' | 11.35 | 6.29 | 75.3 | 66.1 | | 91.62 | 1.84 | 57.6 |
| 20°04' | 20.07 | 11.10 | 147.8 | 114.5 | | 91.62 | 1.84 | 57.6 |
| 18°12' | 18.20 | 10.07 | 134.4 | 104.2 | | 91.87 | 2.09 | 65.4 |
| 16°40' | 16.67 | 9.22 | 123.4 | 95.6 | | 91.96 | 2.18 | 68.2 |
| 26°00' | 26.00 | 14.40 | 190.7 | 147.8 | | 91.90 | 2.20 | 68.9 |
| 25°36' | 25.60 | 14.16 | 187.6 | 145.4 | | 92.11 | 2.33 | 72.9 |
| 30°21' | 30.35 | 16.72 | 221.6 | 171.7 | | 92.11 | 2.33 | 72.9 |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 92.11 | 2.33 | 72.9 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

APOLLO 16

B-10

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (5/11 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (5/11 2008)

Index No. 10 Page No. 1

0.5 in² cone = 3.2258 cm²

| | $\rightarrow \times 5542 \rightarrow$ | \rightarrow | | | | | $\Gamma \times 31.3 \rightarrow$ | \rightarrow | |
|-----------------------|---------------------------------------|-------------------|------------------------|-------------------------|--|------------------------------|----------------------------------|-----------------|--|
| DRUM LOAD \times | DRUM LOAD \times | DRUM CIRCUMF. | LOAD Newtons | STRESS | | INITIAL DEPTH | Δ DRUM DEPTH | ACTUAL DEPTH | |
| deg-min | degrees | DEFLECTION mm, | (from calib. curve) | newtons/cm ² | | Final cm | READING cm. | DEPTH cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | | 89.75 | 0.00 | 0.0 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 1.1 | | 89.81 | 0.13 | 4.1 | |
| 8°12' | 8.20 | 4.54 | 62.5 | 19.4 | | 89.81 | 0.13 | 4.1 | |
| 11°55' | 11.92 | 6.60 | 89.3 | 27.7 | | 89.84 | 0.16 | 5.0 | |
| 22°08' | 22.13 | 12.23 | 162.5 | 50.4 | | 89.85 | 0.17 | 5.3 | |
| 23°31' | 23.52 | 13.01 | 172.6 | 53.5 | | 90.01 | 0.23 | 7.2 | |
| 9°31' | 9.52 | 5.27 | 72.0 | 22.3 | | 90.01 | 0.23 | 7.2 | |
| 21°37' | 21.62 | 11.97 | 159.1 | 49.3 | | 90.01 | 0.23 | 7.2 | |
| 25°14' | 25.23 | 13.98 | 185.2 | 57.4 | | 90.07 | 0.29 | 9.1 | |
| 23°14' | 25.23 | 13.98 | 185.2 | 57.4 | | 90.11 | 0.33 | 10.3 | |
| 11°05' | 11.08 | 6.12 | 83.1 | 25.8 | | 90.11 | 0.33 | 10.3 | |
| 25°46' | 25.77 | 14.25 | 188.8 | 58.5 | | 90.11 | 0.33 | 10.3 | |
| 25°46' | 25.77 | 14.25 | 188.8 | 58.5 | | 90.20 | 0.42 | 13.2 | |
| 25°15' | 25.25 | 14.00 | 185.5 | 57.5 | | 90.22 | 0.44 | 13.8 | |
| 14°40' | 14.67 | 8.11 | 109.8 | 33.7 | | 90.23 | 0.44 | 13.8 | |
| 27°12' | 27.20 | 15.05 | 199.2 | 61.8 | | 90.23 | 0.44 | 13.8 | |
| 24°10' | 24.17 | 13.38 | 177.4 | 55.0 | | 90.23 | 0.45 | 14.1 | |
| 22°32' | 22.63 | 12.53 | 167.4 | 51.9 | | 90.27 | 0.49 | 15.3 | |
| 22°06' | 22.10 | 12.26 | 162.9 | 50.5 | | 90.34 | 0.56 | 17.5 | |
| 11°05' | 11.08 | 6.14 | 83.3 | 25.8 | | 90.34 | 0.56 | 17.5 | |

APOLLO 16

B-12

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (5/4 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (5/4 2008)

Index No. 11 Page No. 1

0.2 in² conc. =

| | $\pi \times 5542$ | | | | | | $\pi \times 31.3$ | |
|------------------------|------------------------|------------------|------------------------|-----------------------------|--|---------------------|------------------------|-----------------|
| DRUM LOAD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | INCL. DRUM DEPTH | Δ DRUM DEPTH | ACTUAL DEPTH |
| deg-min | degrees | DEFLECTN. mm. | (from calib. curve) | newtons/ cm ² | | Final cm | RENDER cm. | DEPTH cm. |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | | 89.77 | 0.00 | 0.0 |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 90.07 | 0.30 | 9.4 |
| 3°52' | 3.87 | 2.14 | 31.3 | 24.3 | | 90.07 | 0.30 | 9.4 |
| 4°22' | 4.37 | 2.42 | 35.0 | 27.1 | | 90.10 | 0.33 | 10.3 |
| 11°31' | 11.52 | 6.39 | 86.6 | 67.1 | | 90.10 | 0.33 | 10.3 |
| 12°31' | 12.52 | 6.93 | 93.6 | 72.5 | | 90.21 | 0.44 | 13.8 |
| 12°31' | 12.52 | 6.93 | 93.6 | 72.5 | | 90.32 | 0.55 | 17.2 |
| 8°44' | 8.73 | 4.23 | 66.3 | 51.4 | | 90.32 | 0.55 | 17.2 |
| 13°51' | 13.85 | 7.68 | 103.3 | 80.1 | | 90.32 | 0.55 | 17.2 |
| 15°41' | 15.68 | 8.69 | 112.5 | 90.3 | | 90.35 | 0.58 | 18.2 |
| 19°43' | 19.72 | 10.92 | 145.5 | 112.8 | | 90.35 | 0.58 | 18.2 |
| 19°13' | 19.22 | 10.65 | 142.0 | 110.1 | | 90.40 | 0.63 | 19.7 |
| 11°01' | 11.02 | 6.11 | 82.9 | 64.2 | | 90.40 | 0.63 | 19.7 |
| 21°05' | 21.08 | 11.68 | 155.3 | 120.4 | | 90.40 | 0.63 | 19.7 |
| 22°55' | 22.92 | 12.69 | 168.5 | 130.6 | | 90.45 | 0.68 | 21.3 |
| 24°28' | 24.47 | 13.55 | 179.7 | 139.3 | | 90.45 | 0.68 | 21.3 |
| 23°53' | 23.83 | 13.20 | 175.1 | 135.7 | | 90.48 | 0.71 | 22.2 |
| 12°22' | 12.37 | 6.84 | 92.4 | 71.6 | | 90.48 | 0.71 | 22.2 |
| 25°21' | 25.35 | 14.02 | 185.8 | 144.0 | | 90.48 | 0.71 | 22.2 |
| 26°23' | 26.55 | 14.69 | 194.5 | 150.7 | | 90.62 | 0.85 | 26.6 |

APOLLO 16

(B-14)

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (% 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (% 2008)

Index No. 12 Page No. 1

0.2 in² cone =

| | ↗ x .5542 ↘ | | | | | ↗ x 31.3 ↘ | |
|-----------------------|------------------------|-------------------|------------------------|------------------------|------------------------------------------|------------------------|-----------------|
| DRUM LMD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | Δ DRUM DEPTH | ACTUAL DEPTH |
| deg-min | degrees | DEFLECTION mm. | (from calib. curve) | newton/cm ² | INITIAL DRUM DEPTH cm | READING cm. | DEPTH cm. |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | 87.72 | 0.00 | 0.0 |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | 87.82 | 0.08 | 2.5 |
| 11°36' | 11.60 | 6.43 | 87.1 | 67.5 | 87.82 | 0.08 | 2.5 |
| 5°30' | 5.50 | 3.04 | 43.0 | 33.3 | 87.87 | 0.08 | 2.5 |
| 9°45' | 9.75 | 5.40 | 73.7 | 57.1 | 87.91 | 0.12 | 3.8 |
| 6°37' | 6.62 | 3.66 | 51.1 | 39.6 | 87.96 | 0.17 | 5.3 |
| 6°37' | 6.62 | 3.66 | 51.1 | 39.6 | 90.01 | 0.22 | 6.9 |
| 9°23' | 9.38 | 5.20 | 71.1 | 55.1 | 90.10 | 0.31 | 9.7 |
| 11°26' | 11.43 | 6.34 | 85.9 | 66.6 | 90.22 | 0.43 | 13.5 |
| 12°40' | 12.67 | 7.01 | 94.6 | 73.3 | 90.23 | 0.44 | 13.8 |
| 12°40' | 12.67 | 7.01 | 94.6 | 73.3 | 90.24 | 0.45 | 14.1 |
| 11°31' | 11.52 | 6.39 | 86.6 | 67.1 | 90.25 | 0.46 | 14.4 |
| 11°47' | 11.78 | 9.30 | 124.4 | 96.4 | 90.25 | 0.46 | 14.4 |
| 17°41' | 17.68 | 9.78 | 130.6 | 125.9 | 90.26 | 0.49 | 15.3 |
| 18°39' | 18.65 | 10.31 | 137.5 | 106.6 | 90.62 | 0.83 | 26.0 |
| 25°31' | 25.52 | 14.18 | 187.8 | 145.5 | 90.62 | 0.83 | 26.0 |
| 24°52' | 24.87 | 13.78 | 182.6 | 141.5 | 90.62 | 0.83 | 26.0 |
| 24°52' | 24.87 | 13.78 | 182.6 | 141.5 | 90.68 | 0.79 | 27.9 |
| 15°26' | 15.43 | 8.55 | 114.7 | 88.9 | 90.68 | 0.89 | 27.9 |
| 29°05' | 29.00 | 16.05 | 212.1 | 164.4 | 90.68 | 0.89 | 27.9 |

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (SN 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (SN 2008)

Index No. 13 Page No. 1

0.2 in² conc

| | ↗ x.5542 | ↓ | | | | | ↖ x.31.3 | ↓ | |
|-----------------------|------------------------|-------------------|------------------------|----------------------------|--|------------------------------------|-----------------|-------------------|--|
| DRUM LMD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | INITIAL SCALE DEPTH | Δ DRUM DEPTH | ACTUAL PENETR. | |
| deg-min | degrees | DEFLECTION mm. | (from calib. curve) | newton/ cm ² | | Final cm | READING cm. | DEPTH cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.0 | | 89.77 | 0.00 | 0.0 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 2.7 | | 89.96 | 0.17 | 5.3 | |
| 8°52' | 8.87 | 4.92 | 67.5 | 52.3 | | 89.98 | 0.19 | 6.0 | |
| 8°28' | 8.47 | 4.69 | 64.5 | 50.0 | | 89.02 | 0.23 | 7.2 | |
| 9°30' | 7.50 | 4.16 | 57.6 | 44.6 | | 90.02 | 0.23 | 7.2 | |
| 14°22' | 14.37 | 7.96 | 107.0 | 82.9 | | 90.02 | 0.23 | 7.2 | |
| 16°00' | 16.00 | 8.87 | 118.8 | 92.1 | | 90.04 | 0.25 | 7.8 | |
| 17°40' | 17.67 | 9.79 | 130.8 | 101.4 | | 90.50 | 0.71 | 22.2 | |
| 11°10' | 16.17 | 8.96 | 120.0 | 93.0 | | 90.66 | 0.87 | 27.2 | |
| 13°05' | 13.08 | 7.25 | 97.8 | 75.8 | | 90.71 | 0.92 | 28.8 | |
| 13°05' | 13.08 | 7.25 | 97.8 | 75.8 | | 90.78 | 0.99 | 31.0 | |
| 13°35' | 13.58 | 7.53 | 101.4 | 78.6 | | 90.83 | 1.04 | 32.6 | |
| 13°35' | 13.58 | 7.53 | 101.4 | 78.6 | | 90.82 | 1.13 | 35.4 | |
| 11°45' | 11.75 | 6.51 | 88.1 | 68.3 | | 91.07 | 1.29 | 40.4 | |
| 13°24' | 13.40 | 7.43 | 100.1 | 77.6 | | 91.17 | 1.38 | 43.2 | |
| 13°24' | 13.40 | 7.43 | 100.1 | 77.6 | | 91.24 | 1.45 | 45.4 | |
| 23°57' | 23.98 | 13.29 | 176.3 | 136.6 | | 91.24 | 1.45 | 45.4 | |
| 24°15' | 24.25 | 13.44 | 178.2 | 138.1 | | 91.29 | 1.50 | 47.0 | |
| 25°52' | 25.87 | 14.34 | 189.9 | 147.2 | | 91.32 | 1.53 | 47.9 | |
| 27°30' | 27.00 | 14.96 | 198.0 | 153.5 | | 91.77 | 2.00 | 62.6 | |

0°00 0.00 0.00* 3.5 2.7

91.77 TREADWELL & MORIWAKI
2.00 62.6

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT (SN 2004)

Lunar Penetration Data Reduction

LUNAR DRUM (SN 2008)

Index No. 15 Page No. 1

1" x 5" plate = 32.258 cm²

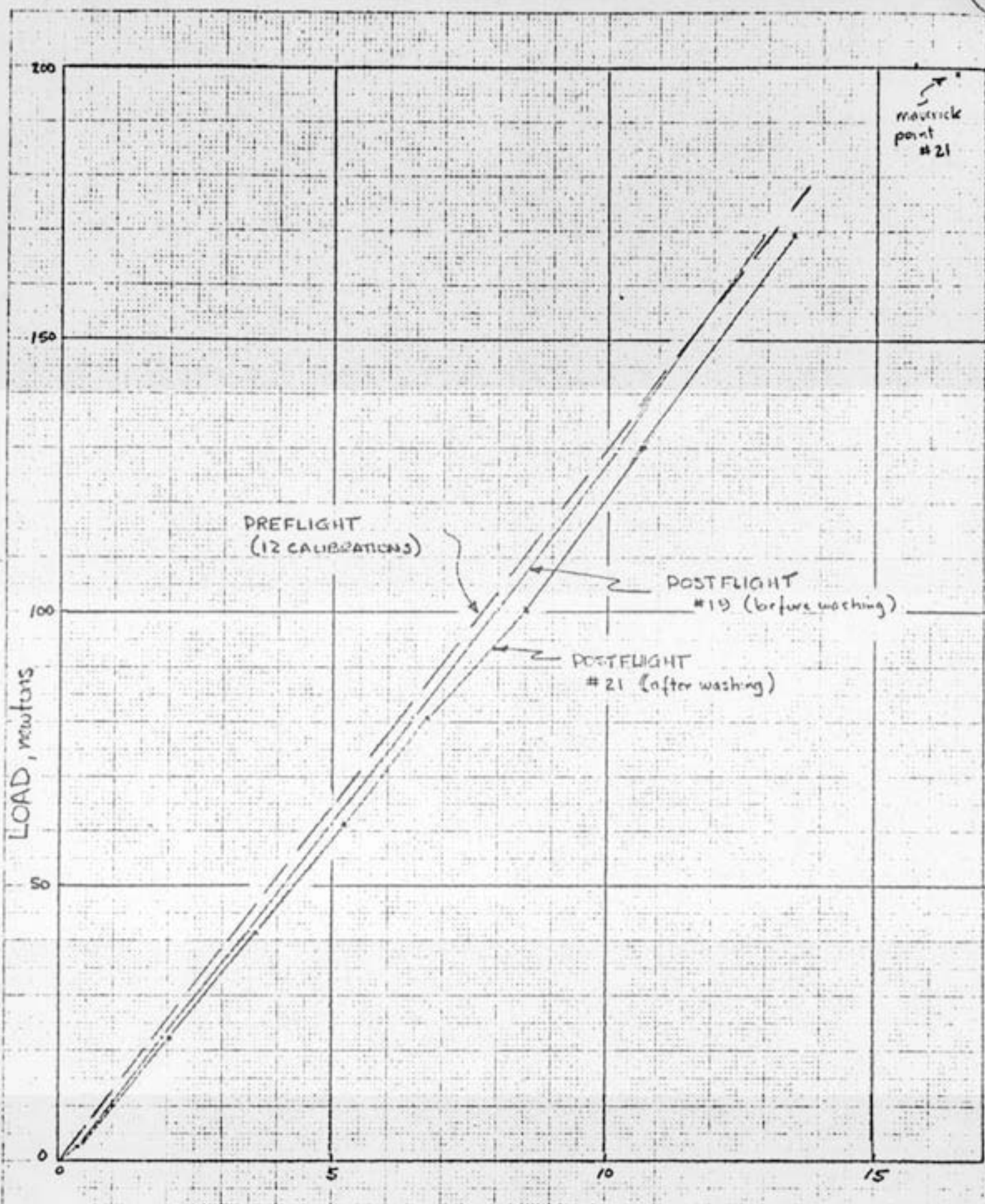
| | → x.5542 | ↘ | | | | | → x.313 | ↘ | |
|------------------------|------------------------|------------------|----------------------|-----------------------------|--|---------------------------------------------------|------------------------|-----------------|--|
| DRUM LOAD λ | DRUM LOAD λ | DRUM CIRCUMF. | LOAD Newtons | STRESS | | $\frac{\text{initial depth}}{\text{final depth}}$ | Δ DRUM DEPTH | ACTUAL DEPTH | |
| deg-min | degrees | DEFECTION mm. | (from calib.cure) | newtons/ cm ² | | cm | cm. | cm. | |
| 0°00' | 0.00 | 0.00 | 0.0 | 0.00 | | 89.79 | 0.00 | 0.0 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 0.11 | | 89.82 | 0.09 | 2.8 | |
| 3°38' | 3.63 | 2.01 | 29.6 | 0.92 | | 89.81 | 0.10 | 3.1 | |
| 4°02' | 4.03 | 2.23 | 32.5 | 1.01 | | 89.71 | 0.12 | 3.8 | |
| 5°20' | 5.33 | 2.95 | 41.9 | 1.30 | | 89.71 | 0.12 | 3.8 | |
| 5°30' | 5.50 | 3.05 | 43.2 | 1.34 | | 89.92 | 0.13 | 4.1 | |
| 8°24' | 8.40 | 4.66 | 64.1 | 1.99 | | 89.92 | 0.13 | 4.1 | |
| 8°24' | 8.40 | 4.66 | 64.1 | 1.99 | | 89.94 | 0.15 | 4.7 | |
| 10°02' | 10.03 | 5.56 | 75.8 | 2.35 | | 89.94 | 0.15 | 4.7 | |
| 16°55' | 16.92 | 9.38 | 125.4 | 3.89 | | 89.98 | 0.19 | 6.0 | |
| 17°13' | 17.22 | 9.54 | 127.5 | 3.95 | | 90.00 | 0.21 | 6.6 | |
| 23°43' | 23.72 | 13.15 | 174.5 | 5.41 | | 90.01 | 0.22 | 6.9 | |
| 23°43' | 23.72 | 13.15 | 174.5 | 5.41 | | 90.02 | 0.23 | 7.2 | |
| 29°35' | 29.58 | 16.39 | 216.6 | 6.71 | | 90.04 | 0.25 | 7.8 | |
| 29°35' | 29.58 | 16.39 | 216.6 | 6.71 | | 90.06 | 0.26 | 8.1 | |
| 27°40' | 27.67 | 15.33 | 202.8 | 6.29 | | 90.06 | 0.26 | 8.1 | |
| 25°15' | 25.25 | 13.99 | 185.4 | 5.75 | | 90.10 | 0.31 | 9.7 | |
| 0°00' | 0.00 | 0.00* | 3.5 | 0.11 | | 90.10 | 0.31 | 9.7 | |

©

APOLLO 16 - LSRP

POST-FLIGHT CALIBRATION

PERMANENT RECORD COPY
FORM 10 X 10 THE CONTINENTAL
NO. 1215



matrix point #21

PREFLIGHT (12 CALIBRATIONS)

POSTFLIGHT #19 (before washing)

POSTFLIGHT #21 (after washing)

LOAD, newtons

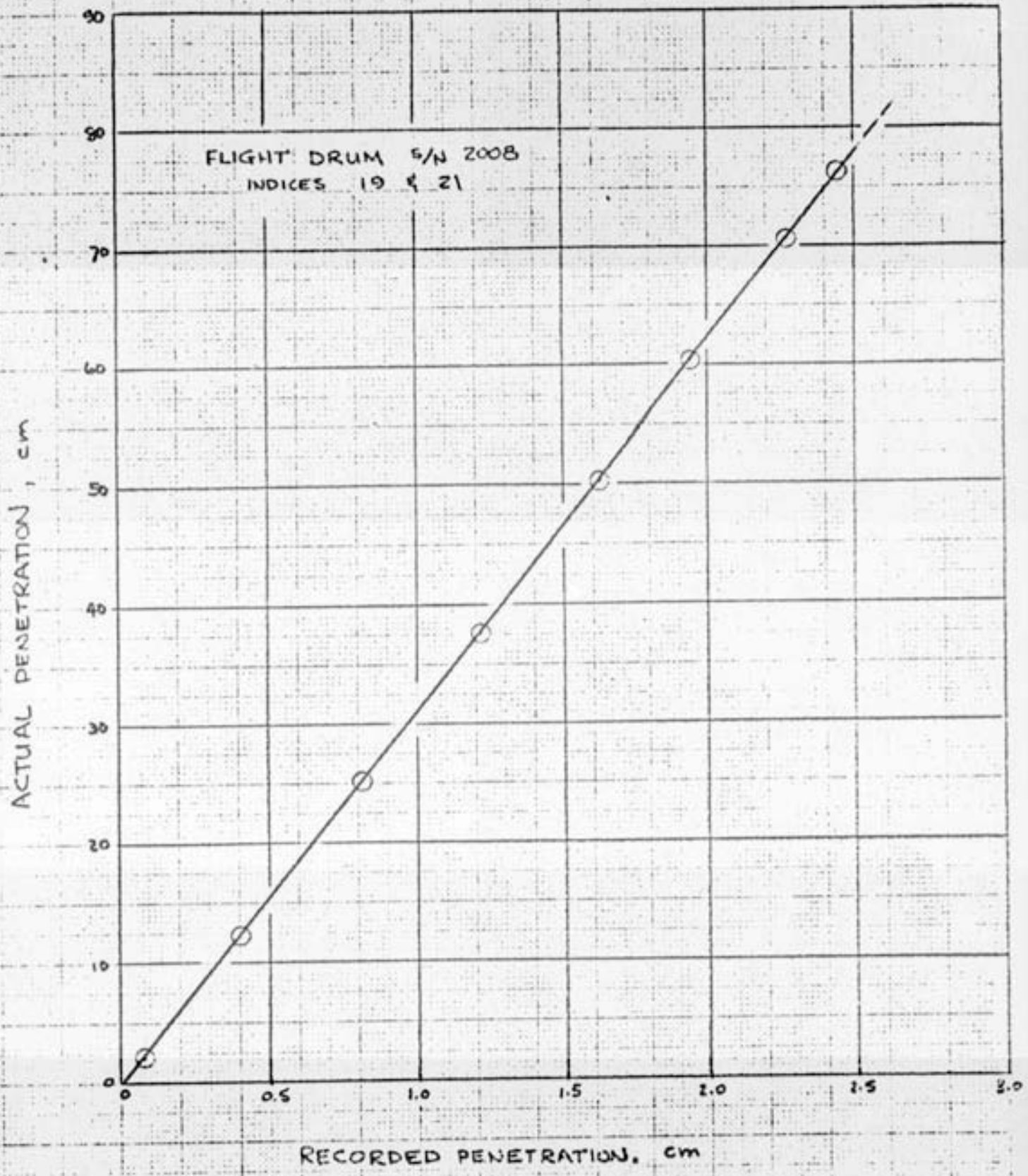
DRUM CIRCUMFERENTIAL DEFLECTION, mm

POSTFLIGHT LOAD CALIBRATION - APOLLO 16 LSRP

+ COMPARISON WITH PREFLIGHT

DDT

RATIO $\frac{\text{ACTUAL}}{\text{RECORDED}} = 31.25$



REPRODUCED FROM THE ORIGINAL DRAWING BY THE ENGINEERING DEPARTMENT, NASA

POSTFLIGHT PENETRATION CALIBRATION - APOLLO 16 LSRP

DDT

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12 MAY 1972

FLIGHT UNIT ()

Lunar Penetration Data Reduction

LUNAR DRUM (5/8 2008)

Page No. _____

Index #21

| DRUM LOAD α | DRUM LOAD β | DRUM CIRCUMF. DEFL. (mm) | LOAD RECTIONS (lb) | DRUM DEPTH PLAS cm | Δ DRUM DEPTH READER cm. | ACTUAL PENETR. DEPTH cm. |
|----------------------------------------|----------------------|--------------------------------|--------------------------|-----------------------------|-----------------------------------------|-----------------------------------|
| 0°00' | 0.00 | 0.0 | | 89.80 | 0.08 | 0.0 |
| 0°41' | 0.67 | 0.37 | 2.41 | 89.80 | | |
| 0°41' | | | | 82.88 | 0.08 | 2.17 |
| 3°37' | 3.62 | 2.04 | 22.05 | 89.88 | | |
| 3°37' | | | | 90.20 | 0.40 | 12.23 |
| 6°30' | 6.50 | 3.60 | 41.6 | 90.20 | | |
| 6°50' | | | | 90.61 | 0.81 | 25.03 |
| 9°26' | 9.43 | 5.22 | 61.2 | 90.61 | | |
| 9°26' | | | | 91.02 | 1.22 | 37.60 |
| 12°06' | 12.10 | 6.70 | 80.9 | 91.02 | | |
| 12°06' | | | | 91.42 | 1.62 | 50.28 |
| 15°22' | 15.37 | 8.51 | 100.6 | 91.42 | | |
| 15°22' | | | | 91.75 | 1.95 | 60.43 |
| 19°15' | 19.25 | 10.66 | 130.0 | 91.75 | | |
| 19°15' | | | | 92.07 | 2.27 | 70.59 |
| 24°22' | 24.37 | 13.48 | 169.3 | 92.07 | | |
| 24°22' | | | | 92.24 | 2.44 | 76.2 |
| 0°00' | 0.00 | | | 92.24 | | |
| SPECIFIC PT = 29°45' = 29.75° = 44.71° | | | | | | |

57.5'

AFTER WASHING w/ALCOHOL

TRENDWELL & MORIWAKI

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

APOLLO 16 - LSRP

Date 11/12

MAY 1972

FLIGHT UNIT ()

Lunar Penetration Data Reduction

LUNAR DRUM (SN 2008)

Page No. _____

(POST-IMPACT CORRECTIONS) Index #19

| DRUM LOAD λ | DRUM LOAD λ | DRUM CIRCUF. | LOAD NEWTONS | | MARK DEPTH | A DRUM DEPTH | ACTUAL DEPTH |
|------------------------|------------------------|-----------------|-----------------|--|---------------|-----------------|-----------------|
| deg-min | degrees | DEFLCEN mm. | (N.B.K.N.) | | cm | READING cm. | DEPTH cm. |
| 0°00' | 0.00 | 0.00 | 0 | | 89.80 | 0.00 | 0.0 |
| 0°35' | 0.58 | 0.32 | 2.41 | | 89.80 | | |
| 0°35' | | | | | 89.88 | 0.08 | 2.17 |
| 3°26' | 3.43 | 1.90 | 22.05 | | 89.88 | | |
| 3°26' | | | | | 90.20 | 0.40 | 12.23 |
| 6°18' | 6.30 | 3.49 | 41.6 | | 90.20 | | |
| 6°18' | | | | | 90.61 | 0.81 | 25.03 |
| 9°00' | 9.00 | 4.98 | 61.2 | | 90.61 | | |
| 9°00' | | | | | 91.01 | 1.21 | 37.60 |
| 11°37' | 11.62 | 6.44 | 80.9 | | 91.01 | | |
| 11°37' | | | | | 91.42 | 1.62 | 50.28 |
| 14°26' | 14.43 | 8.00 | 100.6 | | 91.42 | | |
| 14°26' | | | | | 91.74 | 1.94 | 60.43 |
| 18°26' | 18.43 | 10.20 | 130.0 | | 91.74 | | |
| 18°26' | | | | | 92.07 | 2.27 | 70.59 |
| 23°18' | 23.30 | 12.90 | 169.3 | | 92.07 | | |
| 23°18' | | | | | 92.24 | 2.44 | 76.2 |
| 0°00' | | | | | 92.24 | | |
| | | | | | | | |
| | | | | | | | |

BEFORE WASHING w/ ALCOHOL

TRENDEWELL & MORIWAKI

POST-FLIGHT CALIBRATION - APOLLO 16 LSRP performed at Lockheed Building, Houston 5-2-72

LOADING SEQUENCE

| | TOTAL PEN. | | TOTAL LOAD | |
|---------------------------------|------------|-------|------------|-------|
| | in | cm | kg | N |
| no penetration | 0 | 0 | 0.245 | 2.41 |
| add cap (0.245 kg) | | | | |
| 1 st set of rods | | 2.17 | 2.245 | 22.05 |
| add 2 kg | | | | |
| 2 nd set of rods | | 12.23 | 4.245 | 41.6 |
| add 2 kg | | | | |
| 3 rd set of rods | | 25.03 | 6.245 | 61.2 |
| add 2 kg | | | | |
| 4 th set of rods | | 37.60 | 8.245 | 80.9 |
| add 2 kg | | | | |
| 5 th set of rods | | 50.28 | 10.245 | 100.6 |
| add 2 kg | | | | |
| 6 th set of rods | | 60.43 | 13.245 | 130.0 |
| add 3 kg | | | | |
| 7 th set of rods | | 70.59 | 17.245 | 169.3 |
| add 4 kg | | | | |
| go to latches | | 76.2 | | |
| remove all load (including cap) | | | 0 | 0 |

special point on index #21 44.71 # \approx 199 N
@ 29.75° = 16.45 mm

Lockheed Bldg; Houston

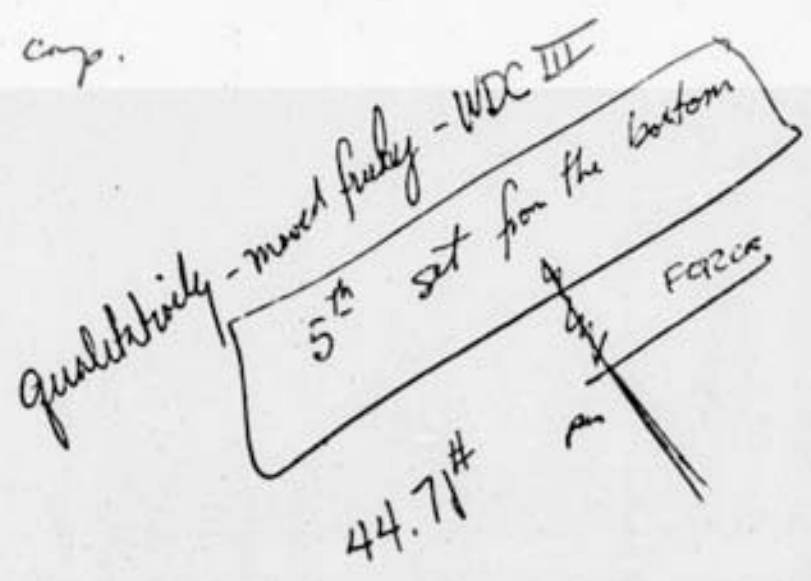
| | | |
|-------------------------|--------------------------------------------|------------|
| bottom out | | |
| no penetration | | Total load |
| | add cap (0.245 kg) | + 0.245 |
| 1 st set rds | | |
| | add 2kg ✓ ✓ | 2.245 |
| 2 nd set " | | |
| | add 2kg ✓ ✓ | 4.245 |
| 3 rd set " | | |
| | add 2kg ✓ | 6.245 |
| 4 th set " | | |
| | add 2kg ✓ | 8.245 |
| 5 th set " | | |
| | add 2 kg ✓ | 10.245 |
| 6 th set " | | |
| | add 3 | 13.245 |
| 7 th set " | | |
| | add 4 kg | 17.245 |
| | take off all load including cap | |

go to latches

take off load including cap.

with dirt on Index 19

cleaned on Index 21 -

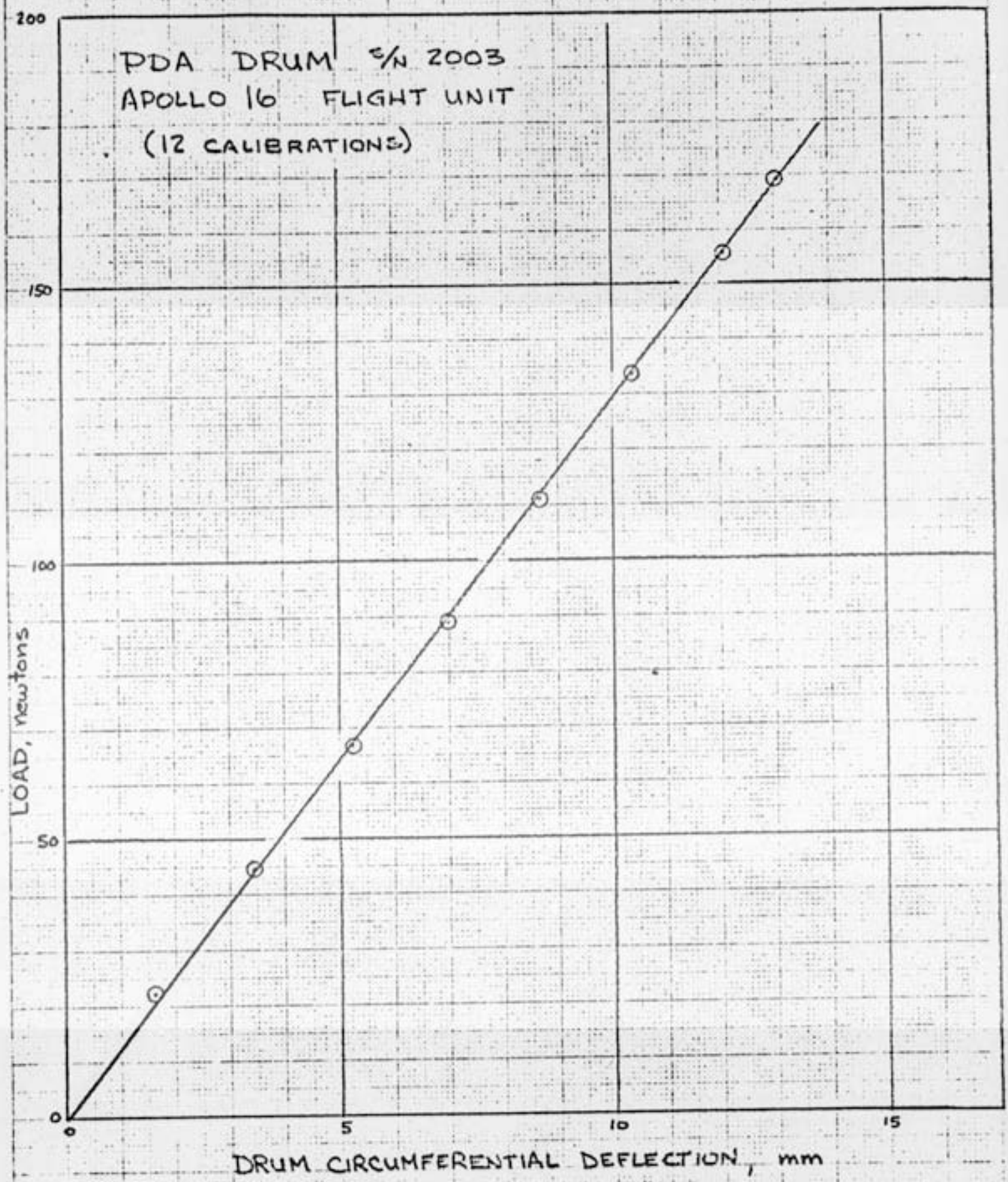


qualitatively - moved fixture - WDC III

(D)

APOLLO 16 ~LSRP

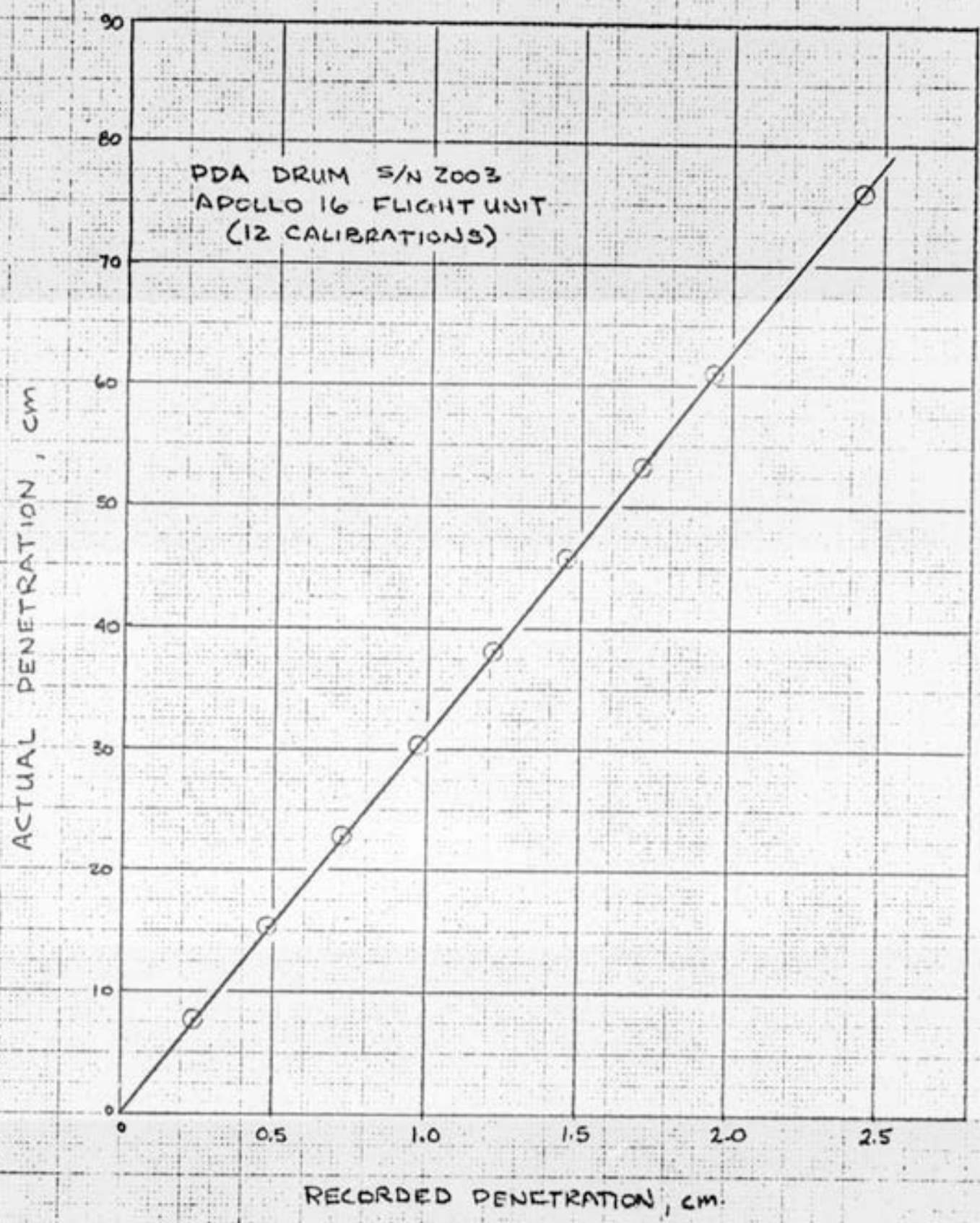
PRE-FLIGHT CALIBRATION



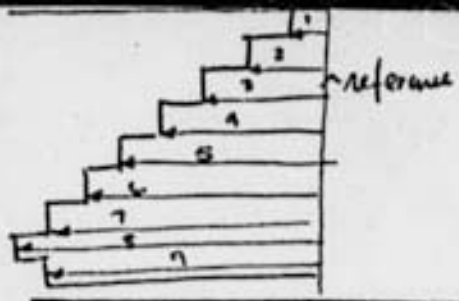
PREFLIGHT LOAD CALIBRATION - APOLLO 16 LSRP

REPRODUCED FROM THE REPORT OF THE
COMMISSION ON THE SPACE SHUTTLE
PROGRAM

RATIO $\frac{\text{ACTUAL}}{\text{RECORDED}} = 31.3$



PREFLIGHT PENETRATION CALIBRATION - APOLLO 16 LSRP



UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

Date 19 April 1972

DEADWEIGHT LOADING

NASA Drum No. S/N 2003

"REPERMUTATION CALIBRATION"

"LOAD"

| INDEX # | AZIMUTH | | | | | | | | | |
|----------|---------|---------|---------|---------|---------|------------|---------|---------|------------|---------|
| | REF. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | 0°00' | 2°53' | 5°15' | 10°02' | 13°25' | 17°46' | 19°15' | 21°46' | 23°25' | 21°46' |
| 3 | 33°01' | 32°57' | 31°31' | 29°33' | 42°57' | 45°25' | 48°24' | 51°51' | 53°32' | 52°51' |
| 5 | 60°10' | 63°03' | 66°22' | 69°39' | 72°50' | 75°25' | 77°51' | 79°50' | 81°42' | 83°50' |
| 7 | 90°15' | 92°52' | 96°25' | 99°43' | 103°11' | 106°01' | 109°27' | 112°12' | 115°37' | 112°12' |
| 9 | 120°03' | 123°05' | 126°32' | 129°52' | 132°22' | 135°15°50' | 139°50' | 142°25' | 145°32°45' | 142°25' |
| 11 | 150°07' | 152°01' | 156°13' | 159°33' | 162°40' | 165°25' | 168°57' | 172°30' | 176°04' | 172°30' |
| 13 | 180°05' | 183°01' | 186°12' | 189°34' | 192°40' | 194°45' | 196°42' | 200°00' | 203°33' | 200°00' |
| 15 | 210°02' | 213°02' | 216°17' | 219°31' | 222°35' | 225°26' | 228°26' | 231°42' | 235°07' | 231°42' |
| 17 | 240°00' | 242°57' | 246°16' | 249°31' | 252°37' | 255°42' | 258°46' | 261°51' | 265°11' | 261°51' |
| 19 | 270°15' | 272°52' | 276°36' | 279°15' | 282°22' | 285°26' | 288°25' | 291°47' | 295°22' | 291°47' |
| 21 | 300°00' | 302°58' | 306°12' | 309°31' | 312°30' | 315°31' | 318°47' | 321°36' | 325°00' | 321°36' |
| 23 | 330°00' | 332°05' | 336°12' | 339°24' | 342°34' | 345°31' | 348°41' | 351°42' | 355°20' | 351°42' |
| 1 | VV | VV | VV | VV | VV | VV | VV | VV | VV | VV |
| LOAD lbs | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 33 | 35 | |
| LOAD, N | 22.25 | 44.5 | 66.8 | 89.0 | 111.1 | 133.5 | 155.8 | 149.1 | 155.8 | |
| AVG dy | 2°54' | 6°12' | 9°27' | 12°36' | 15°38' | 18°43' | 21°48' | 23°34' | 21°48' | |
| AVG deg. | 2.90° | 6.20° | 9.45° | 12.60° | 15.63° | 18.72° | 21.80° | 23.57° | 21.90° | |
| AVG .. | 1.605 | 3.43 | 5.73 | 6.98 | 8.66 | 10.37 | 12.06 | 13.02 | 12.06 | |

| REF. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|-------------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 1 | 0°00' / 2°50' | 7°15' / 7°15' | 10°02' / 10°02' | 13°25' / 13°25' | 17°46' / 17°46' | 19°15' / 19°15' | 21°46' / 21°46' | 23°35' / 23°35' | 21°46' / 21°46' |
| 3 | 30°01' / 32°57' | 37°07' / 7°06' | 39°33' / 9°32' | 42°38' / 12°37' | 45°35' / 15°34' | 48°34' / 18°33' | 51°51' / 21°50' | 53°33' / 23°32' | 52°51' / 21°50' |
| 5 | 60°10' / 63°03' | 66°22' / 6°12' | 69°39' / 9°29' | 72°50' / 12°40' | 75°53' / 15°43' | 78°52' / 18°42' | 82°00' / 21°50' | 83°52' / 23°42' | 82°00' / 21°50' |
| 7 | 90°15' / 93°08' | 96°26' / 6°11' | 99°43' / 9°28' | 103°00' / 12°45' | 106°01' / 15°46' | 109°07' / 18°52' | 112°12' / 21°57' | 113°52' / 23°37' | 112°12' / 21°57' |
| 9 | 120°38' / 123°05' | 126°22' / 6°14' | 129°32' / 9°24' | 132°50' / 12°42' | 135°58' / 15°50' | 138°59' / 18°51' | 142°00' / 21°52' | 143°53' / 23°45' | 142°00' / 21°52' |
| 11 | 150°07' / 153°01' | 156°13' / 6°06' | 159°30' / 9°23' | 162°47' / 12°40' | 165°55' / 15°48' | 168°57' / 18°50' | 172°00' / 21°53' | 173°51' / 23°44' | 172°00' / 21°53' |
| 13 | 180°05' / 183°01' | 186°10' / 6°05' | 189°34' / 9°29' | 192°40' / 12°35' | 195°45' / 15°40' | 198°45' / 18°40' | 201°56' / 21°51' | 203°43' / 23°38' | 201°56' / 21°51' |
| 15 | 210°08' / 213°02' | 216°25' / 6°17' | 219°31' / 9°23' | 222°35' / 12°27' | 225°36' / 15°28' | 228°36' / 18°28' | 231°42' / 21°34' | 233°15' / 23°07' | 231°42' / 21°34' |
| 17 | 240°00' / 242°52' | 246°16' / 6°16' | 249°31' / 9°31' | 252°37' / 12°37' | 255°40' / 15°40' | 258°48' / 18°48' | 261°51' / 21°51' | 263°36' / 23°36' | 261°51' / 21°51' |
| 19 | 269°55' / 272°52' | 276°06' / 6°11' | 279°15' / 9°20' | 282°30' / 12°35' | 285°15' / 15°20' | 288°35' / 18°40' | 291°42' / 21°47' | 293°28' / 23°33' | 281°42' / 21°47' |
| 21 | 300°00' / 302°58' | 306°12' / 6°12' | 309°31' / 9°31' | 312°30' / 12°30' | 315°31' / 15°31' | 318°47' / 18°47' | 321°39' / 21°39' | 323°30' / 23°30' | 321°39' / 21°39' |
| 23 | 330°00' / 332°50' | 336°12' / 6°12' | 339°24' / 9°24' | 342°34' / 12°34' | 345°34' / 15°34' | 348°41' / 18°41' | 351°42' / 21°42' | 353°29' / 23°29' | 351°42' / 21°42' |

D-4

UNIVERSITY OF CALIFORNIA
Soil Mechanics Laboratory

Date 19 April 1972

DEADWEIGHT LOADING

NASA Drum No. S/N 2003

"PENETRATION CALIBRATION"

| INDEX | | | | | | | | | | | DELTA FROM REF. cm |
|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|--------------------|
| NO. ↓ | REF. | A | B | C | D | E | F | G | H | I | |
| 1 | 89.87 | 90.11 | 90.35 | 90.53 | 91.02 | 91.32 | 91.57 | 91.81 | 92.30 | | |
| 3 | | | | | | | | | | | |
| 5 | | | | | | | | | | | |
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| 21 | | | | | | | | | | | |
| 23 | | | | | | | | | | | |
| AVERAGE Δ | 0.00 | 0.24 | 0.48 | 0.72 | 0.97 | 1.21 | 1.45 | 1.70 | 1.94 | 2.43 | |
| EQUIV inches | 0 | 3 | 6 | 9 | 12 | 15 | 19 | 21 | 24 | 30 | |
| EQUIV cm. | 0 | 7.62 | 15.24 | 22.85 | 30.5 | 38.1 | 45.7 | 53.3 | 61.0 | 76.2 | |

