



Springfield Hospital Wesson Memorial Hospital Wesson Women's Hospital

mb 2974

October 23, 1979

Mr. Francis St. Mary
Division of Material Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

279 001 26 PM 24
U.S. MAIL SECTION

Reference: Your control # 00686 dated 7-24-79

License No.: 20-01412-03

Subject: Your telephone request (10-15-79) for information on calibration of survey meters.

Dear Mr. St. Mary:

As per your request the following documents are submitted in support of our letter dated July 18, 1979.

I. The calibration graphs for Panoramic Survey Meter (Model#470A,S225)

- Set #1: February, 1978
- Set #2: October, 1978
- Set #3: January, 1979
- Set #4: September, 1979

The measurements made were verified by another survey meter EG & G (Model 8004) and calibrated using low energy sources. The data sheets are encbsed.

- Table I: For I-131 : April 16, 1979
- Table II: For Tc99m : April 16, 1979

II. A copy of calibration report of the standard source (Cobalt-60) used in these calibrations is enclosed.

III. The method of calibration of our survey meter is based on the recommended procedure in Regulatory Guide 10.8, page 23 (Appendix D, Section 1), January 1979.

I hope this information is useful in your evaluation of our license.

Thank you.

XA Copy Has Been Sent to PD

Sincerely,

Suresh M. Brahmavar, Ph.D.
Director, Medical Physics &
Radiation Safety

COPIES SENT TO OFF. OF
INSPECTION AND ENFORCEMENT

7911210270

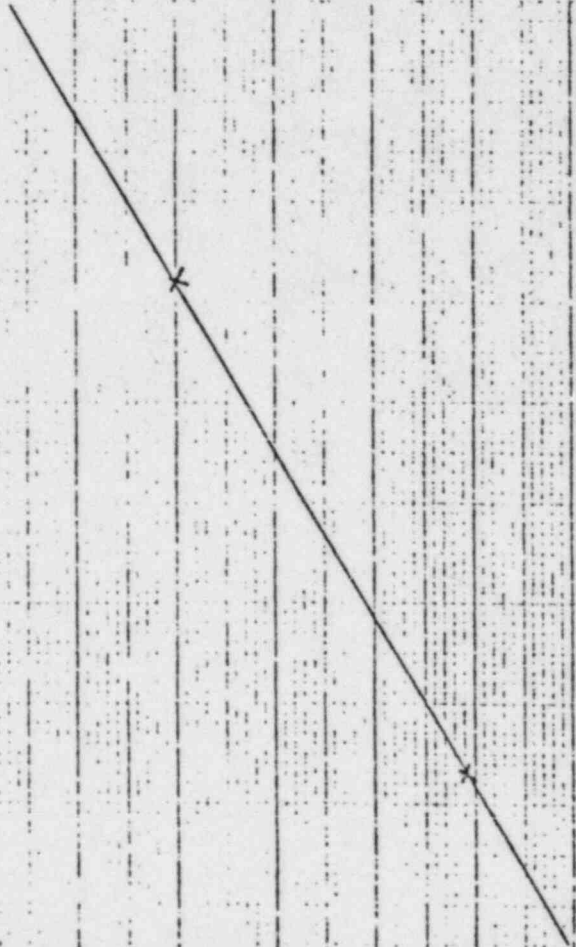
C
9-79

Panoramic Survey Meter Model 470A #225 300 Nr/Hr Scale

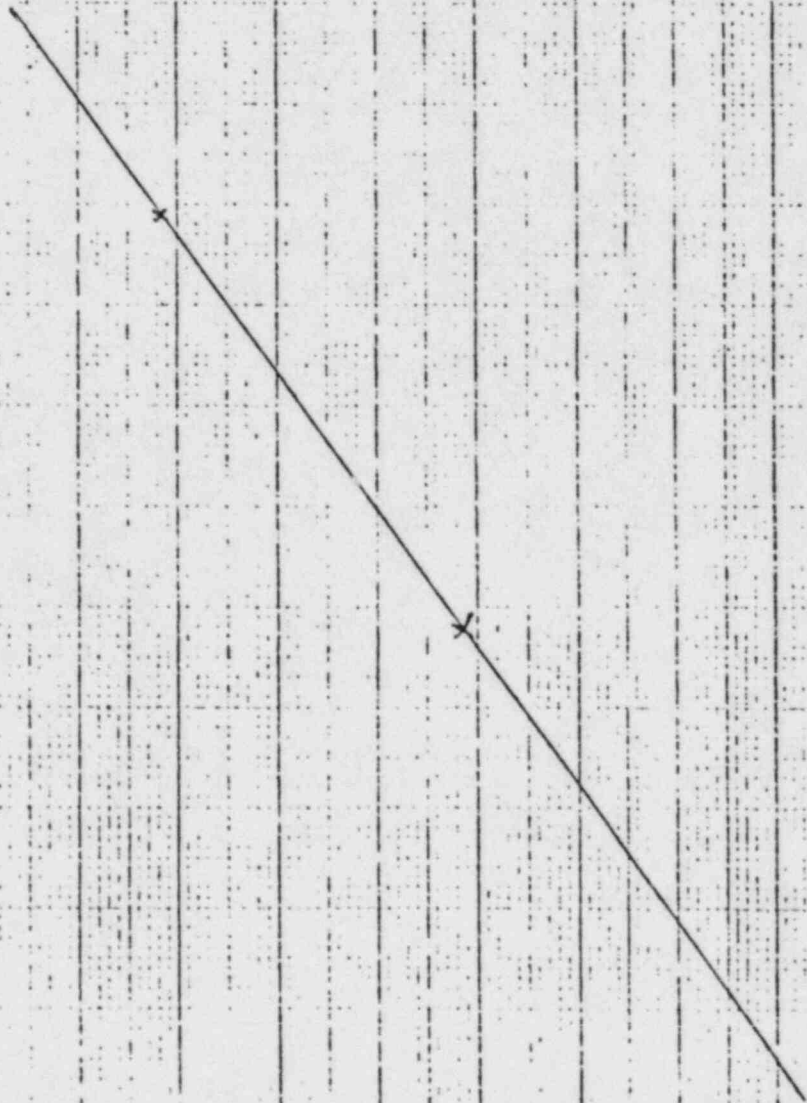


0 50 100 150 200 250 300

Panoramic Survey Meter Model 470A #223 100 Mr/Hr Scale 9-79



Panoramic Survey Meter Model 470 A # 225 30 Mr/Hr Scale 9-79



Panoramic Survey Meter Model 470A #225 10 Mr / Hr Scale 9-79



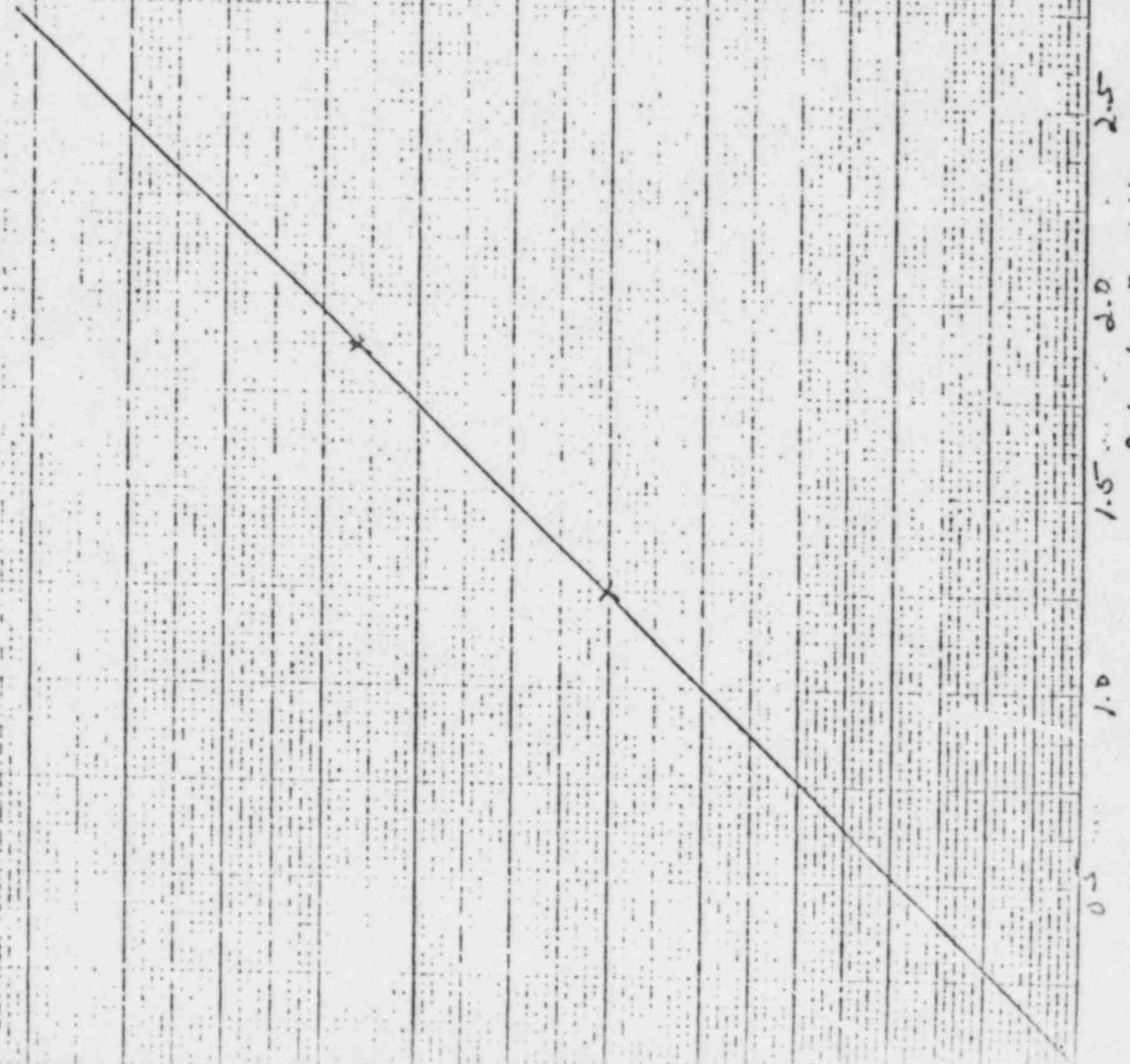
1 2 3 4 5 6 7 8 9 10

11

Set #4

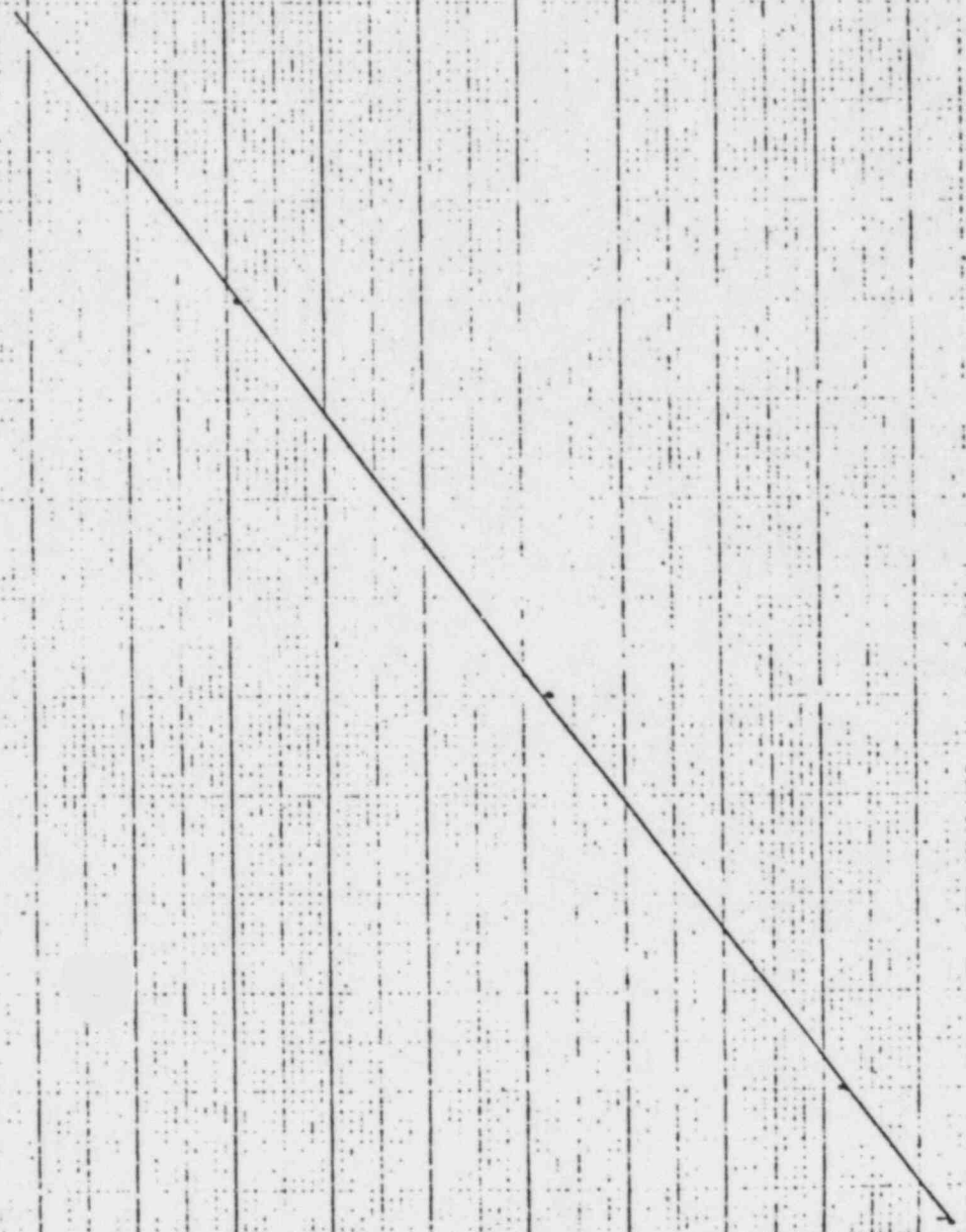
9-79

Paworanic Survey Meter Model 470A "das" - 3 Nr/Hr Sedk.



1-79
300 Nr/Hr Scale

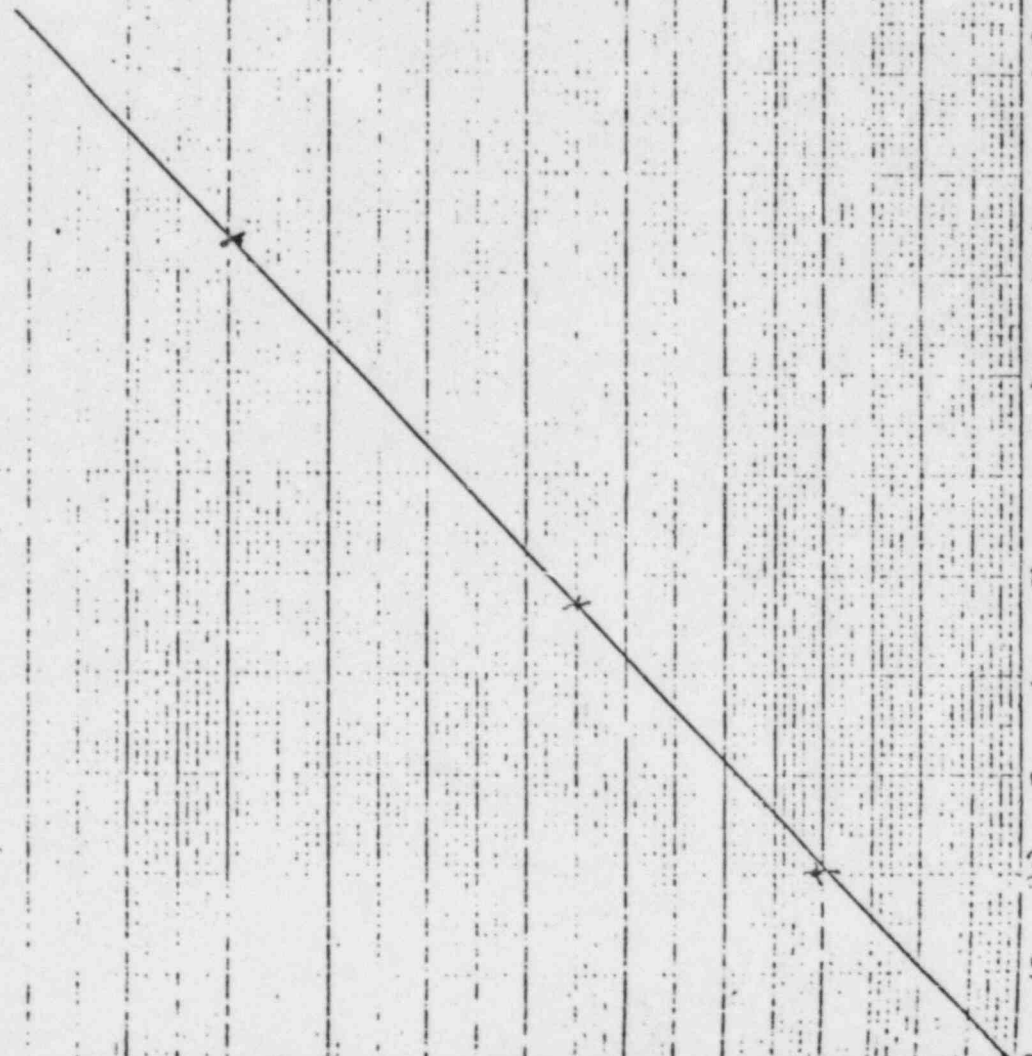
Panoramic Survey Meter Model 470A #225



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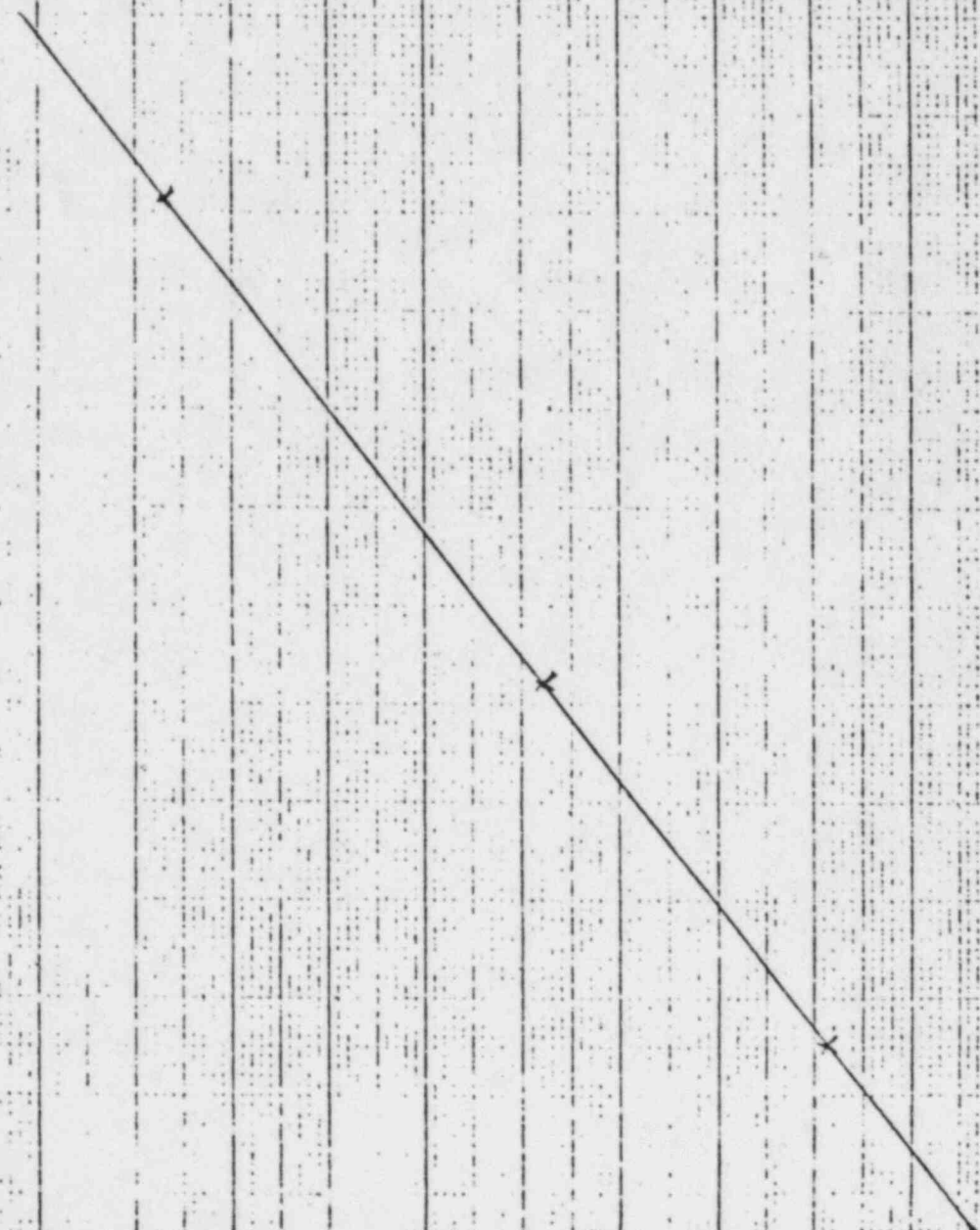
1-79

Panoramic Survey Meter Model 470A #225 100 Mr/Hr Scale



10 20 30 40 50 60 70 80 90 100

Panoramic Survey Meter Model 470 A # 225 30 Mr/Hr Scale 1-79



Parronric Survey Meter Model 470A \pm 0.5 10 Mc / Hr Scale 1-79



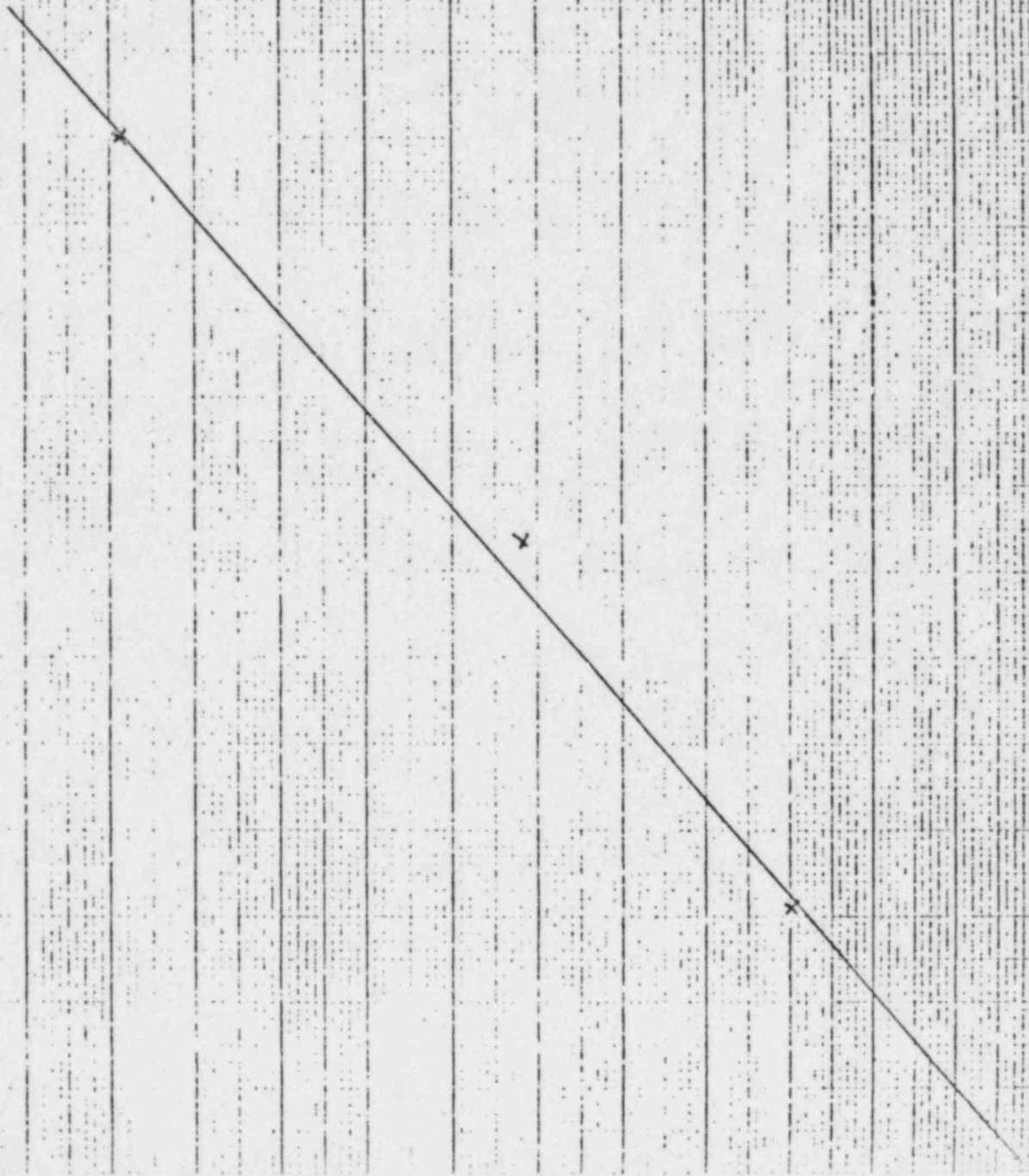
(

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Set #3

Pawronic Survey Meter Model 450A #2225 3 Nr/Hr Scale

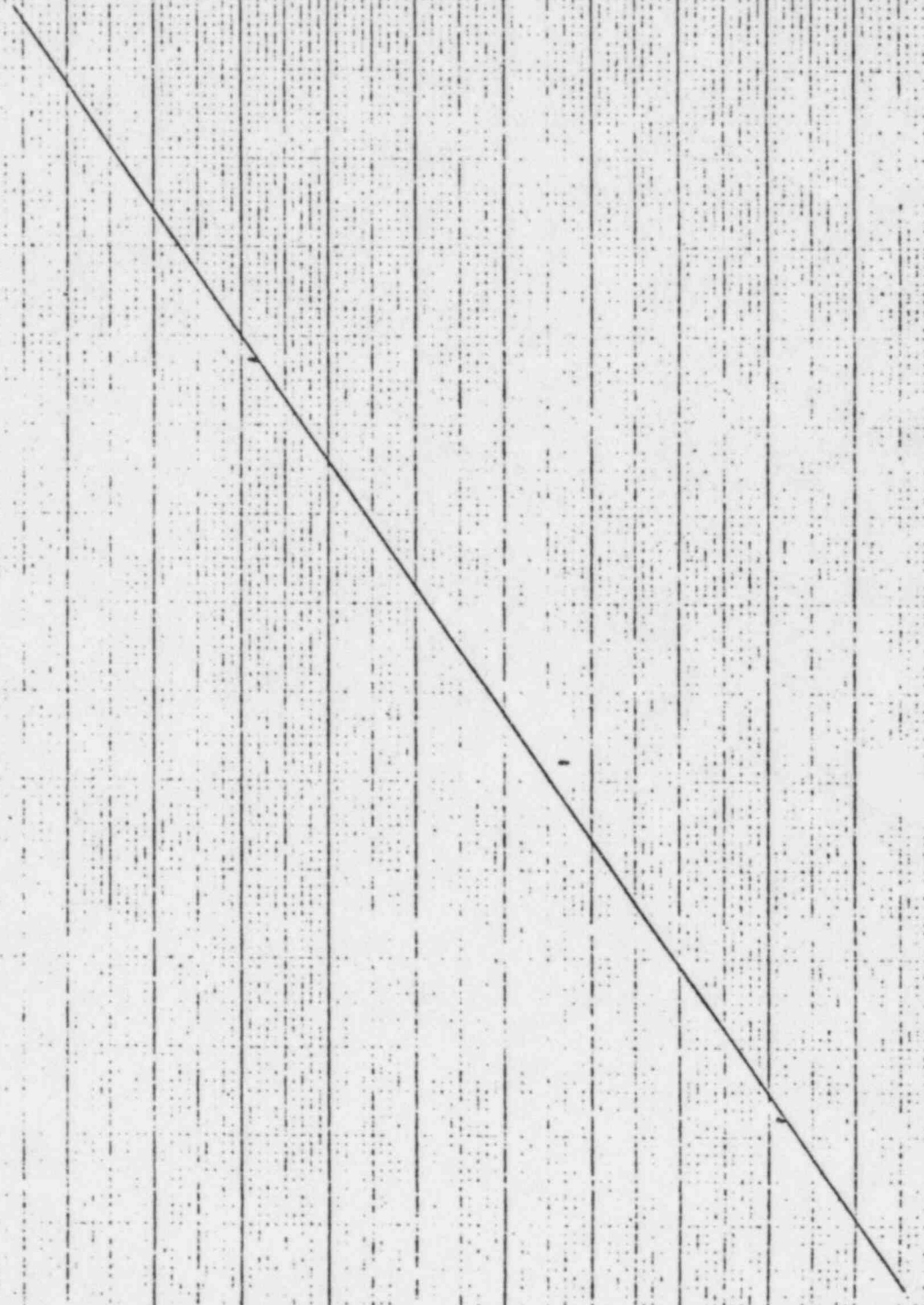
1-79



10

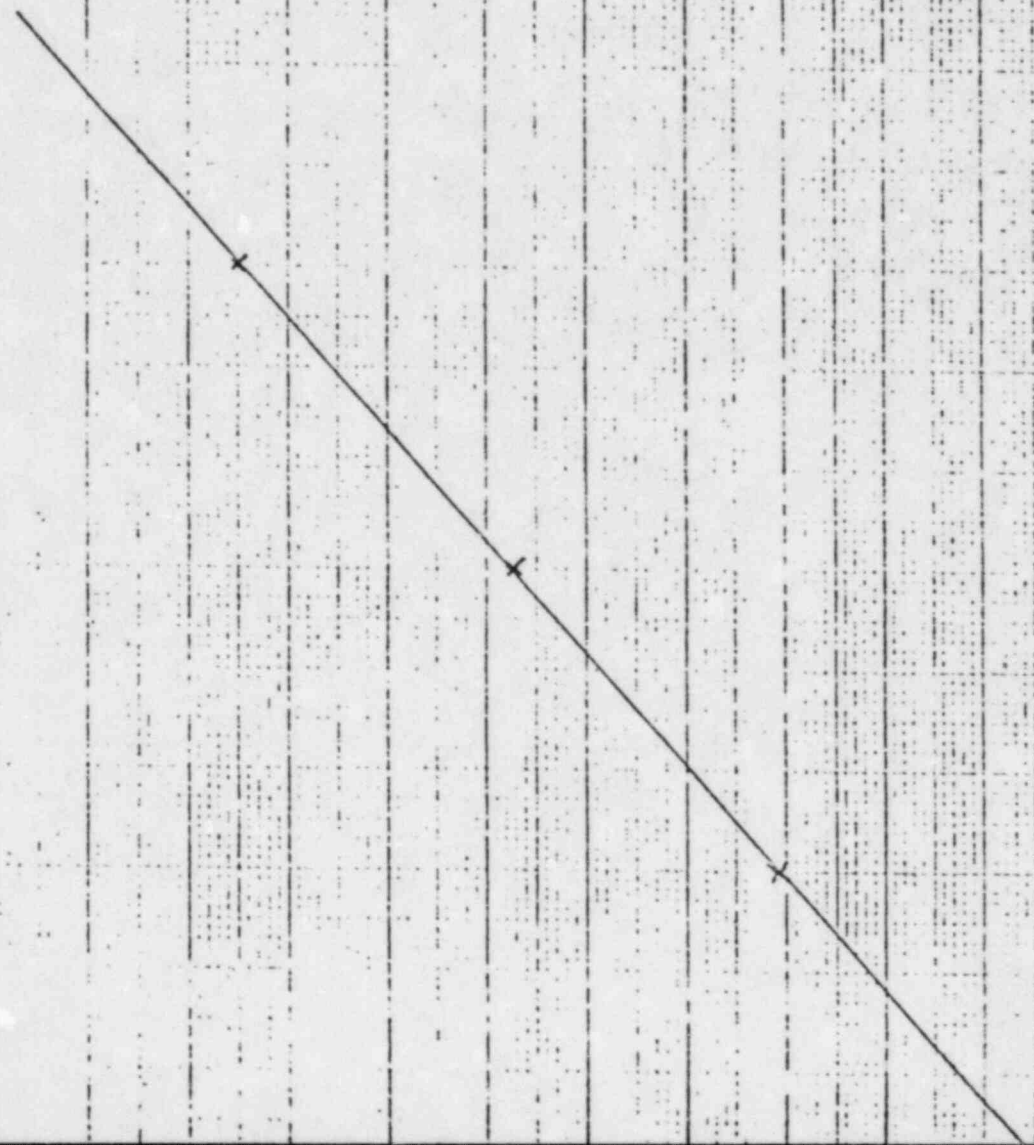
10-78
300 Nr/Hr Scale

Panoramic Survey Meter Model 470A #225

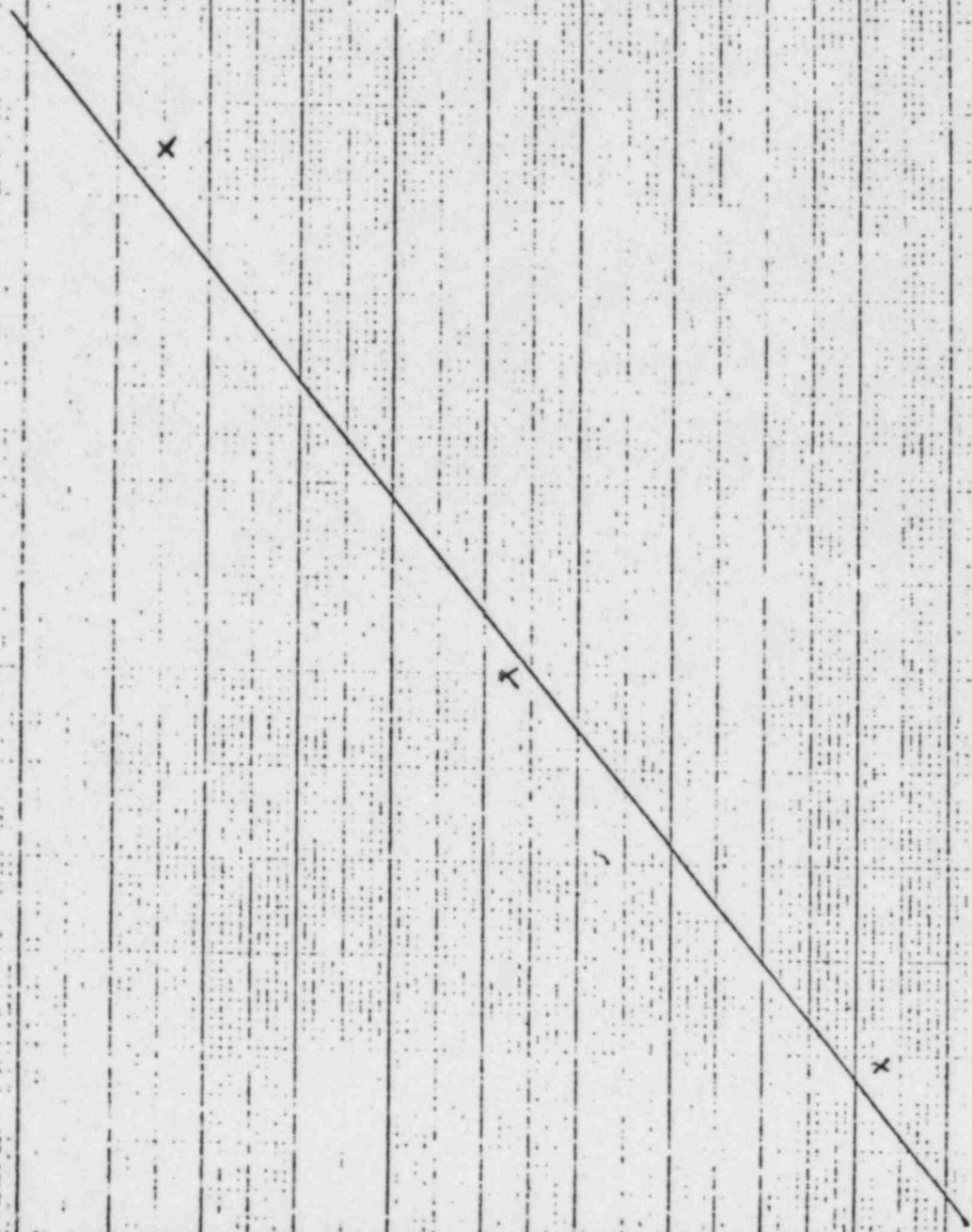


0 50 100 150 200 250 300

Panoramic Survey Meter Model 470A #223 1000 Mr/Hr Scale 10-78



Panoptic Survey Meter Model 470 A # 225 30 Mr/Hr Scale 10-78



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Panasonic Survey Meter Model 470A ⁴⁰⁰⁵ 10 Mr / Hr Scale 10-75



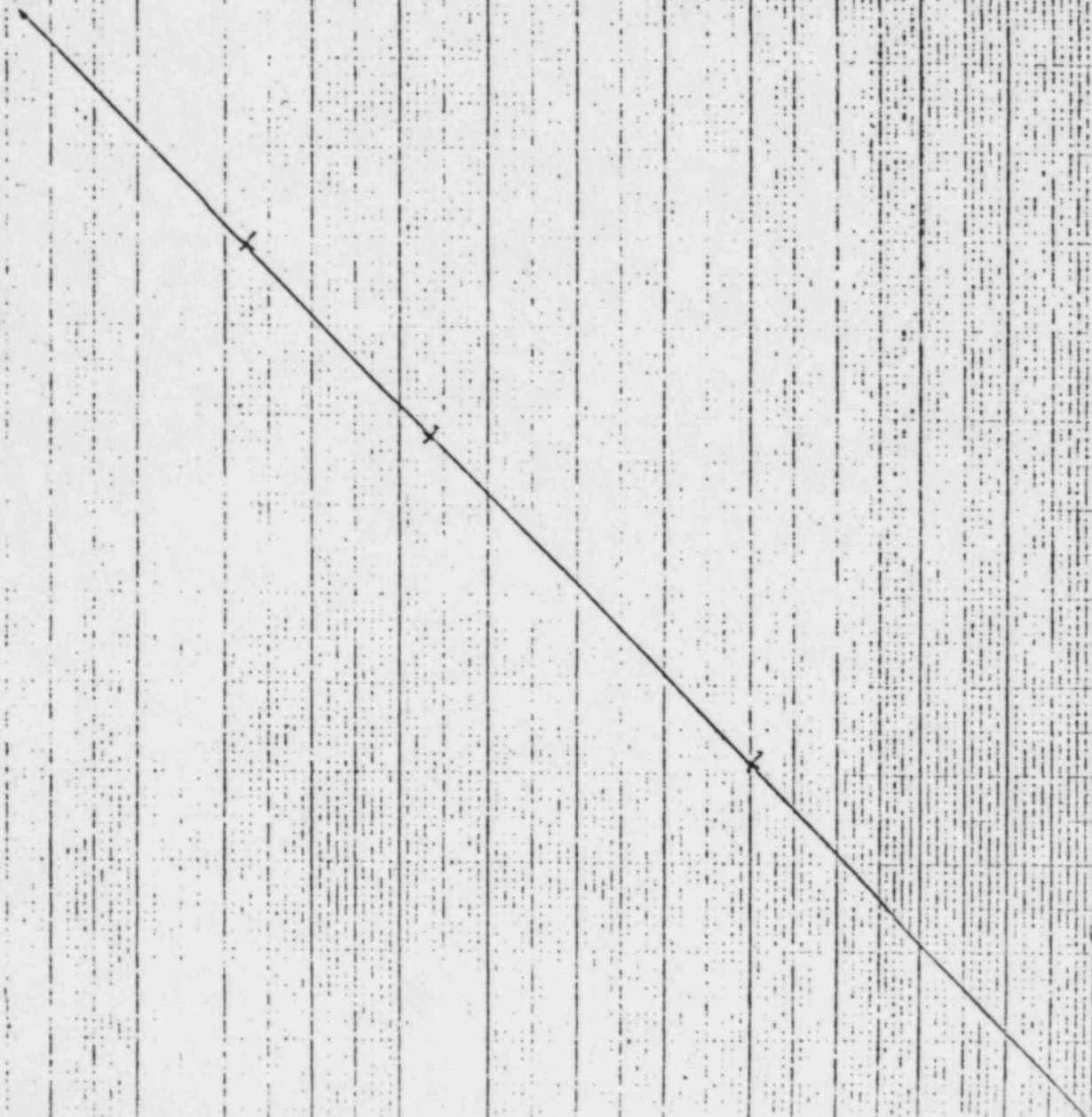
1 2 3 4 5 6 7 8 9 10

11

Set 02
10-78

Parabolic Survey Meter Model 470A "2225" 3 Nr/Hr Scale

20



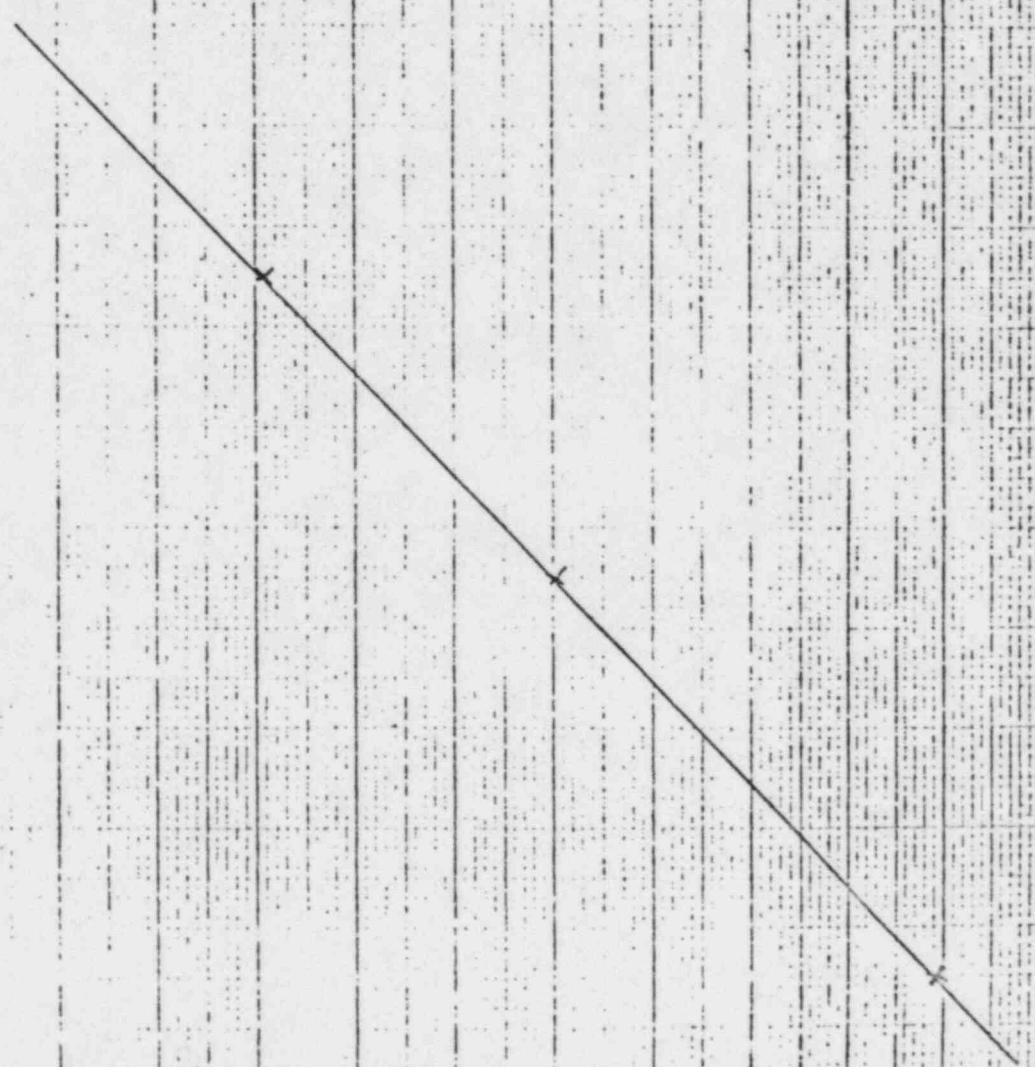
0.5 1.0 1.5 2.0 2.5 3.0

2-78
300 Hr/Hr Scale

Panoramic Survey Meter Model 470A #225



Panasonic Survey Meter Model 470A #225 100 Mr/Hr Scale 2-78



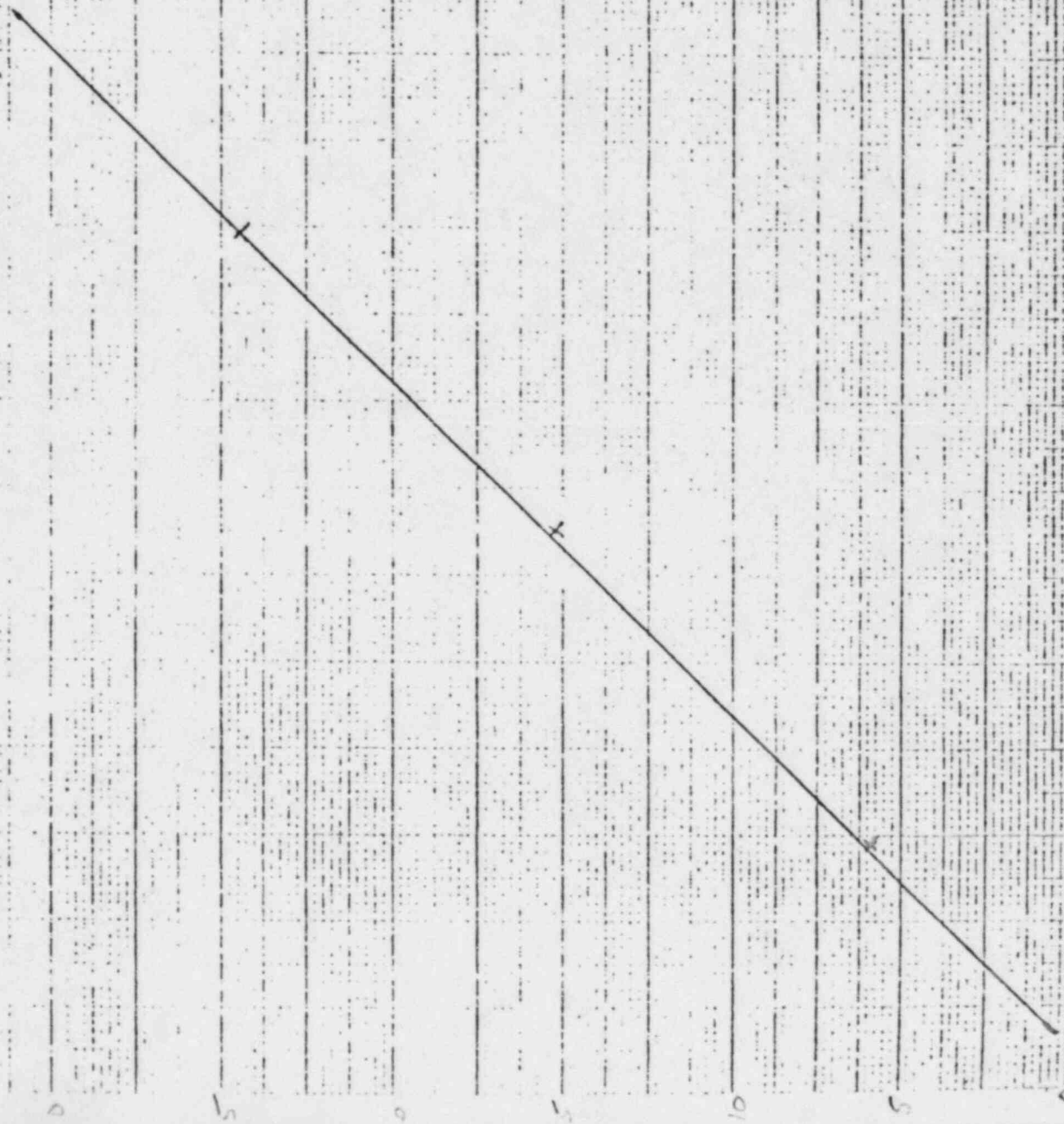
0 10 20 30 40 50 60 70 80 90 100
M. H.

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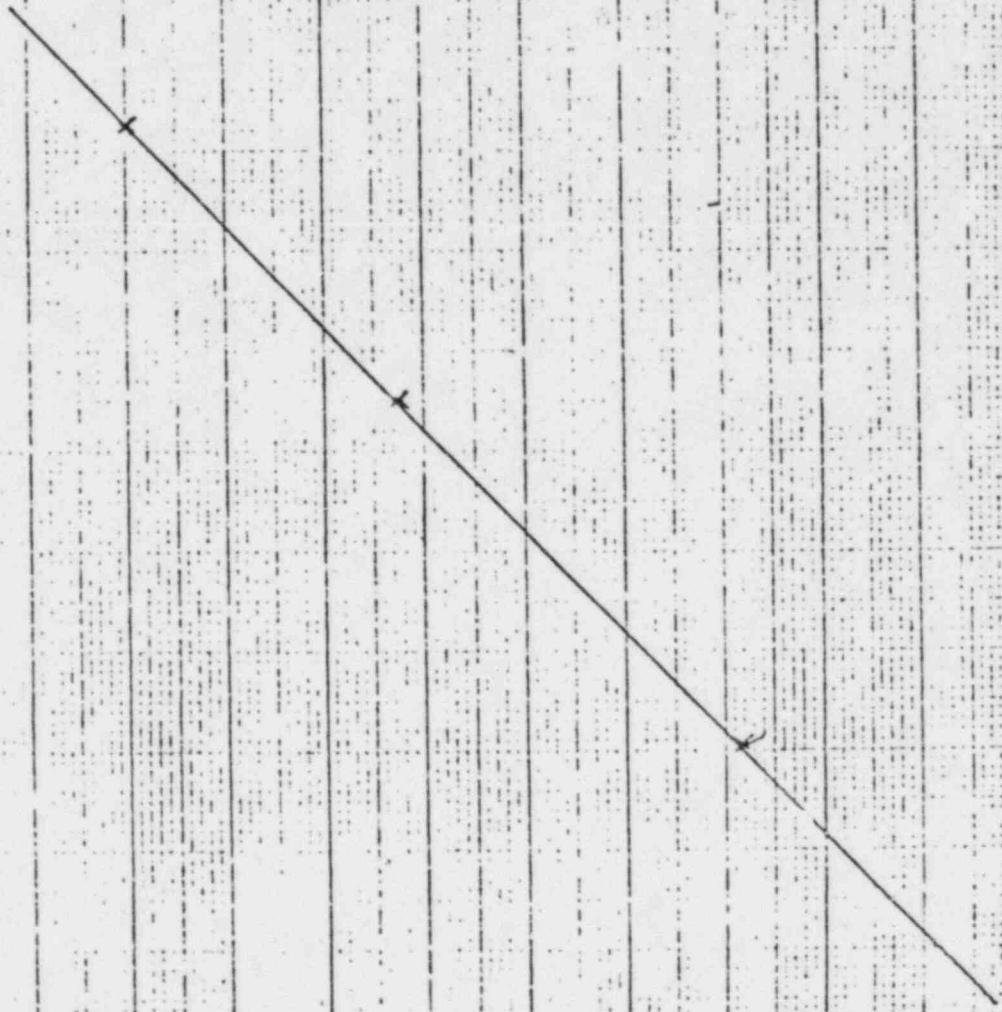
Panoramic Survey Meter Model 470 A # 2055 - 30 Mr/Hr - Scale 2-78



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Panoramic Survey Deter Model 470A #225 10 Mr/Hr Scale 2-78

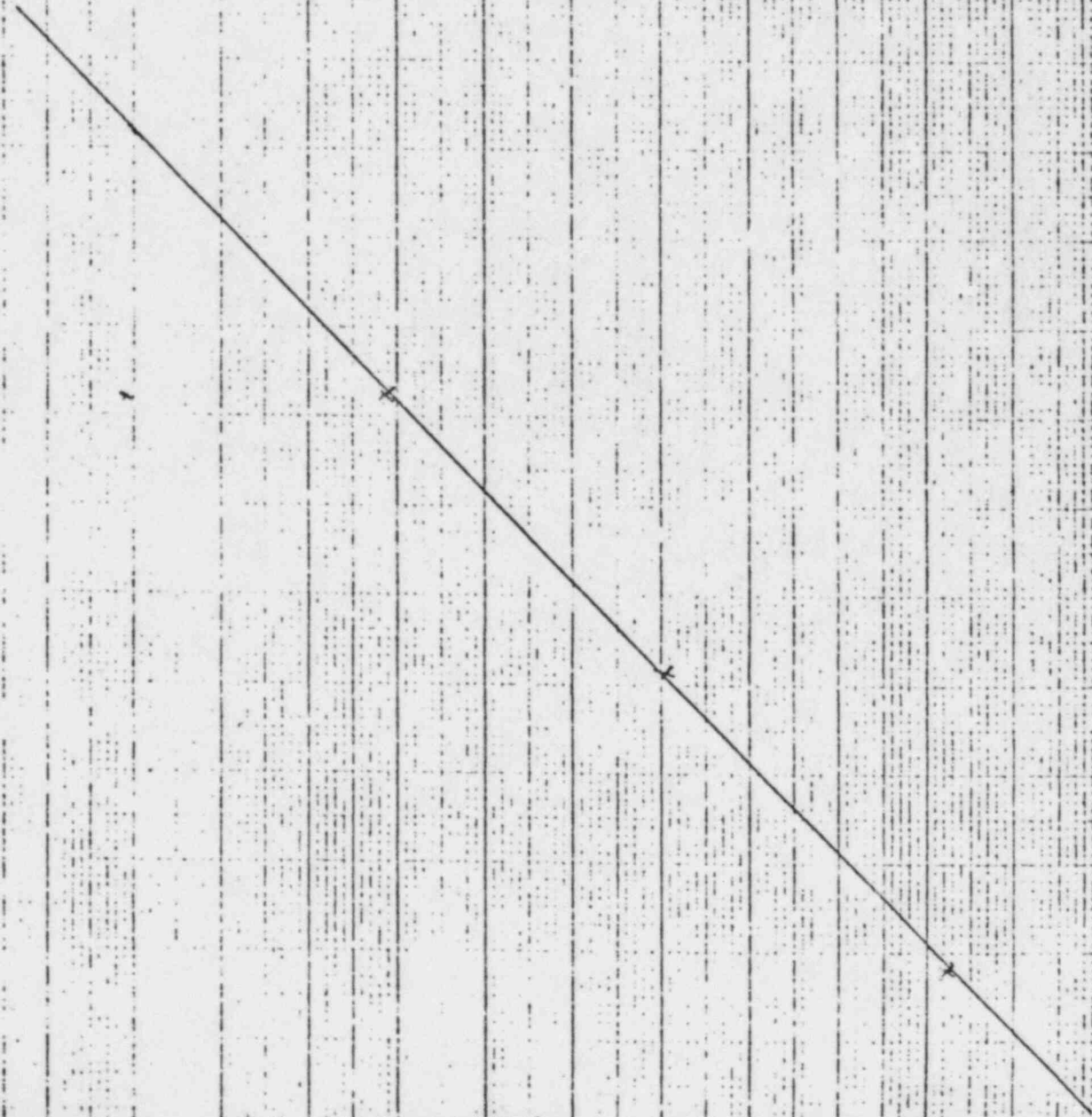


Set #1

2-78

Panoramic Survey Meter Model 470A "data" 3 Nr/Hr Scale

100



Calibration of Survey Meter : EG & G 8004

Date of Calibration : April 12, 1979

2071

| Distance in Meters | 10 mCi calculated mR/hr | Meter Measurement Mode | | 100 mCi Calculated mR/hr | Meter Measurement Mode | |
|--------------------|-------------------------|------------------------|-----------|--------------------------|------------------------|------------|
| | | 10 mR/hr | 100 mR/hr | | 100 mR/hr | 1000 mR/hr |
| 1.0 | 0.56 | 0.7 | | 5.6 | 6.0 | |
| 0.9 | 0.69 | 0.8 | | 6.9 | 7.0 | |
| 0.8 | 0.87 | 0.9 | | 8.7 | 9.0 | |
| 0.7 | 1.14 | 1.2 | | 11.4 | 12.2 | |
| 0.6 | 1.55 | 1.7 | | 15.5 | 16.4 | |
| 0.5 | 2.25 | 2.3 | | 22.5 | 23.0 | |
| 0.4 | 3.50 | 3.8 | | 35.0 | 37.0 | |
| 0.3 | 6.22 | 6.5 | | 62.2 | 64.2 | |
| 0.2 | 14.0 | | 14.8 | 140.0 | | 149.0 |
| 0.1 | 56.0 | | 59.2 | 560.0 | | |

Results:

Use for monitoring of radiation levels in AMK.

Recommendations:

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Measured Data and Results : I-131Table IICalibration of Survey Meter : EG & G 8024Date of Calibration : April 16, 1979

| Distance in Meters | 10 mCi calculated mR/hr | Meter Measurement Mode | | 100 mCi calculated mR/hr | Meter Measurement Mode | |
|-----------------------|-------------------------------|------------------------|-----------|--------------------------------|------------------------|------------|
| | | 10 mR/hr | 100 mR/hr | | 100 mR/hr | 1000 mR/hr |
| 1.0 | 2.1 | 2.2 | | 21.0 | 22.0 | |
| 0.9 | 2.59 | 2.6 | | 25.9 | 27.0 | |
| 0.8 | 3.28 | 3.4 | | 32.8 | 34.0 | |
| 0.7 | 4.28 | 4.4 | | 42.8 | 44.0 | |
| 0.6 | 5.83 | 6.1 | | 58.3 | 59.2 | |
| 0.5 | 8.40 | 8.3 | | 84.0 | 85.4 | |
| 0.4 | 13.1 | | 14.2 | 131.0 | | 133.5 |
| 0.3 | 23.3 | | 24.1 | 233.0 | | 236 |
| 0.2 | 52.5 | | 53.6 | 525.0 | | 541 |
| 0.1 | 210 | | — | 2100.0 | | — |

Results:

Use for measurement of radiation levels
in Patient Rooms.

Recommendations:

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Kochops

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Decay of cobalt-60
may be compensated
strength by approx

| Age in: | yr | Cobalt (5.25) |
|---------|----|------------------|
| 0 | | 1.000 |
| 1 | | .876 |
| 2 | | .768 |
| 3 | | .673 |
| 4 | | .590 |
| 5 | | .517 |
| 6 | | .453 |
| 7 | | .397 |
| 8 | | .348 |
| 9 | | .305 |
| 10 | | .267 |
| 11 | | .234 |
| 12 | | .205 |

TECHNICAL OPERATIONS, INCORPORATED
Burlington, Mass.

Isotope C⁶⁰ Test No. 74983

STANDARDS LABORATORY REPORT

Gamma Ray Source Calibration

For Wesson Memorial Hospital
140 High Street
Springfield, Mass.

and iridium-192 sources
by multiplying reported
appropriate tabulated factors.

| Cobalt-60 (yrs) | Iridium-192 (75 days) | |
|--------------------|--------------------------|-------|
| | weeks | days |
| 1.000 | 1.000 | 1.000 |
| .989 | .937 | .991 |
| .978 | .879 | .982 |
| .967 | .824 | .972 |
| .957 | .772 | .964 |
| .947 | .723 | .955 |
| .937 | .678 | .946 |
| .926 | .636 | .937 |
| .916 | .595 | |
| .906 | .559 | |
| .896 | .523 | |
| .886 | .491 | |
| .876 | .460 | |

The gamma-ray emission of the sealed source herein described was intercompared with the radiation from a reference standard cobalt-60 source. This reference source was either one that had been directly measured by the National Bureau of Standards or one that had been standardized against an NBS-calibrated source. Comparison was made in free air using a plastic-lined ionization chamber controlled by a vacuum tube electrometer feedback circuit with stability and readout precision better than one part per thousand. The ionization chamber is encased in a 3-mm thick aluminum container sealed against atmospheric pressure. Inverse square distance measurements have established that the percentage of the observed intensity due to radiation scattered by objects other than source and detector is less than the stated uncertainty of the measurement.

| <u>Date of Measurement</u> | <u>Source Identification</u> | <u>Roentgens per Hour at One Meter</u> | <u>Curies*</u> |
|----------------------------|------------------------------|--|----------------|
| <u>4-10-70</u> | <u>S-383</u> | <u>1.35 X .015</u> | <u>.015</u> |

The source was measured with its axis of symmetry ┌ the line joining source and detector. The reported output is believed to be correct within ±3 percent; the stated uncertainty of the reference NBS sources. Relative accuracy is believed to be better than ±1 percent.

*assuming 1.35 rhm/curie cobalt-60
or 0.55 rhm/curie iridium-192

For the Laboratory Paul R. ...