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Report on

A NON-DESTRUCTIVE METHOD FOR MEASURING WALL THICKNESS
OF PIPE FROM ONE SIDE

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A NON-DESTRUCTIVE METHOD FOR MEASURING WALL THICKNESS
OF PIPE FROM ONE SIDE

Drilling and calipering are the two methods commonly employed in determining wall thickness of pipe. Drilling is a destructive test which must be ruled out in many cases. The use of calipers requires access to the interior of the pipe and is often impractical for bent sections and long lengths. This report describes a non-destructive method for measuring wall thickness of pipe from one side, with the aid of a small source of gamma radiation and a Geiger counter.

The principle of the method is illustrated by the schematic drawing, Figure 1, Plate (1). A radium pellet and Geiger counter are mounted in fixed relationship to each other at opposite ends of a beam (A). In position (1), radiation from the source reaches the counter without obstruction. As the beam A is moved radially towards the axis of the pipe, the gamma ray intensity at the counter remains unchanged until position (2) is reached. Below (2) the pencil of gamma rays is intercepted by the wall of the pipe, with a resulting decrease of intensity at the counter. From (2) to (3) the mass of absorber in the path of the rays steadily increases while the intensity at the counter decreases accordingly. Beyond position (3), the pencil of radiation emerges from the inner wall and the intensity transmitted to the counter starts to rise. The general course of intensity recorded by the counter plotted against motion of the beam A is illustrated in Figure (2). The distance between points (2) and (3) is the thickness of the pipe wall.

Any particular problem can be handled by a simple rig, designed to meet the following requirements: (1) beam A must move along a radial scale, rigidly mounted with respect to the pipe; (2) the pencil of radiation must be normal to the radius at the point of tangency.

This method was tested on a variety of pipes with the results illustrated in Plates (2) to (5). Bent pipe can be handled as readily as straight pipe, and it is possible to determine the thickness of liners and external coatings as well as of the pipe wall itself. The method is suitable for rapid rough measurement with counting circuits.

The principles of Geiger counter measurement of gamma ray intensity are treated in NRL Report M-1799.

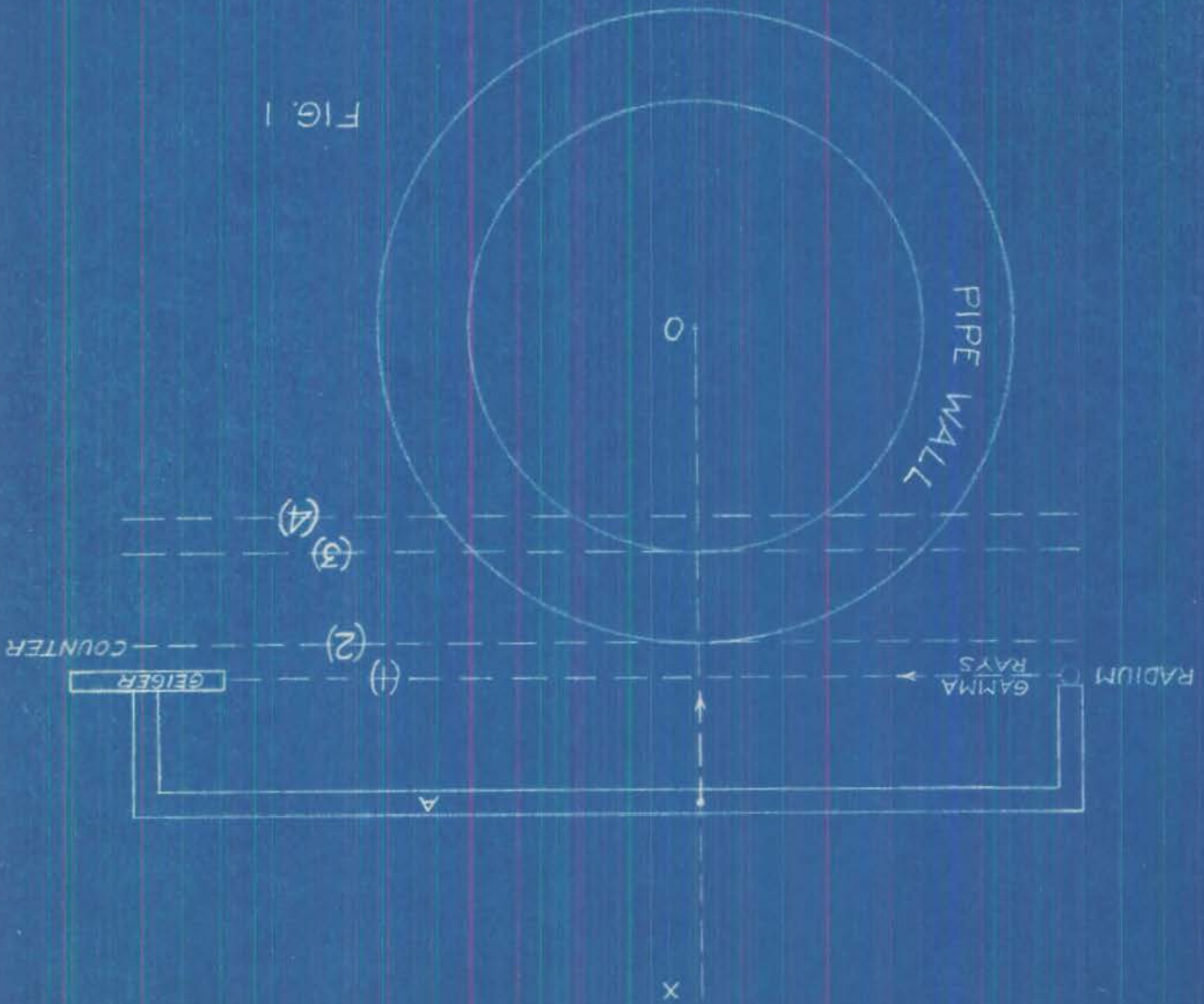


FIG. 1

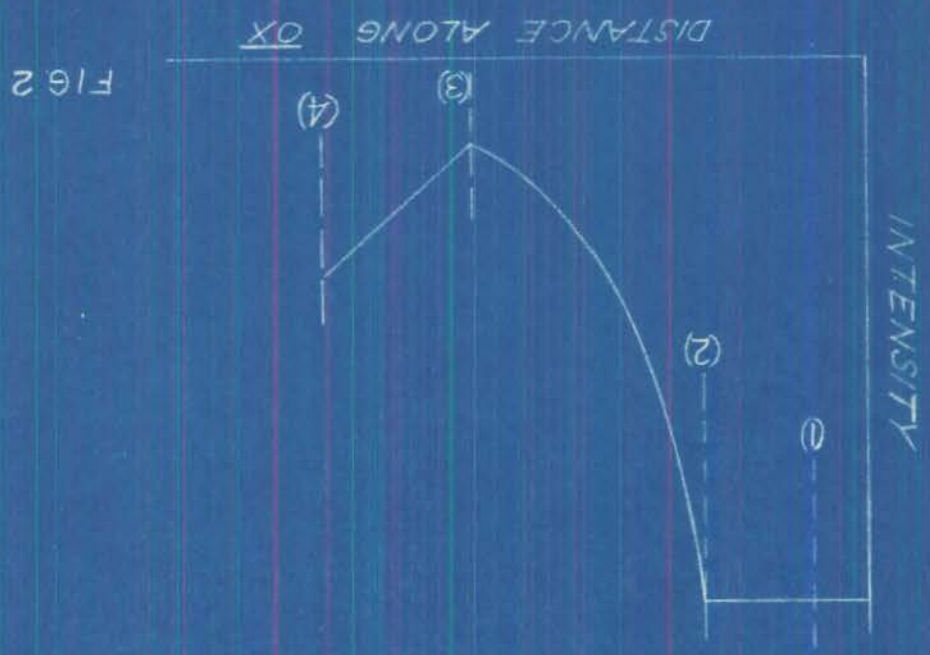
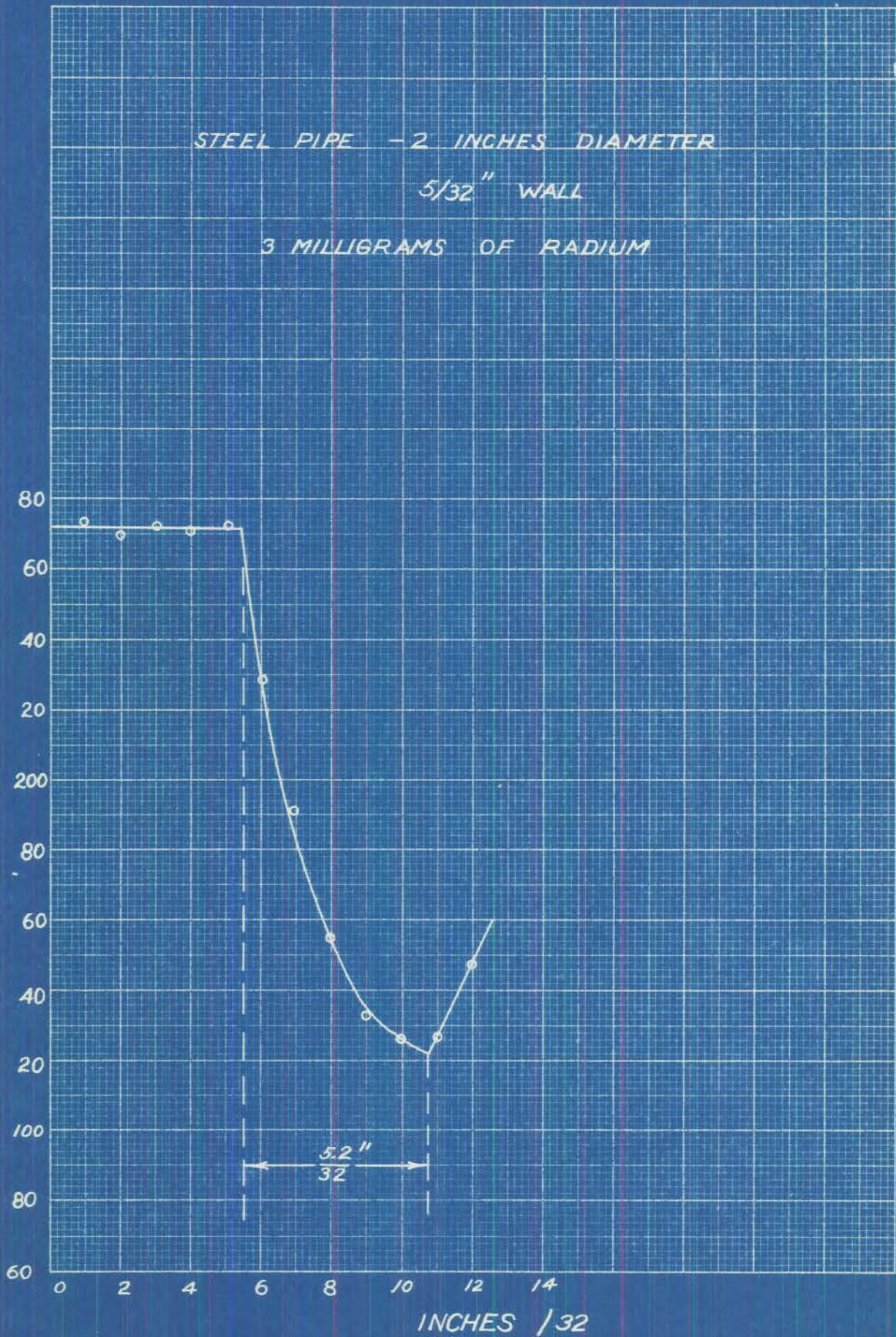


FIG. 2



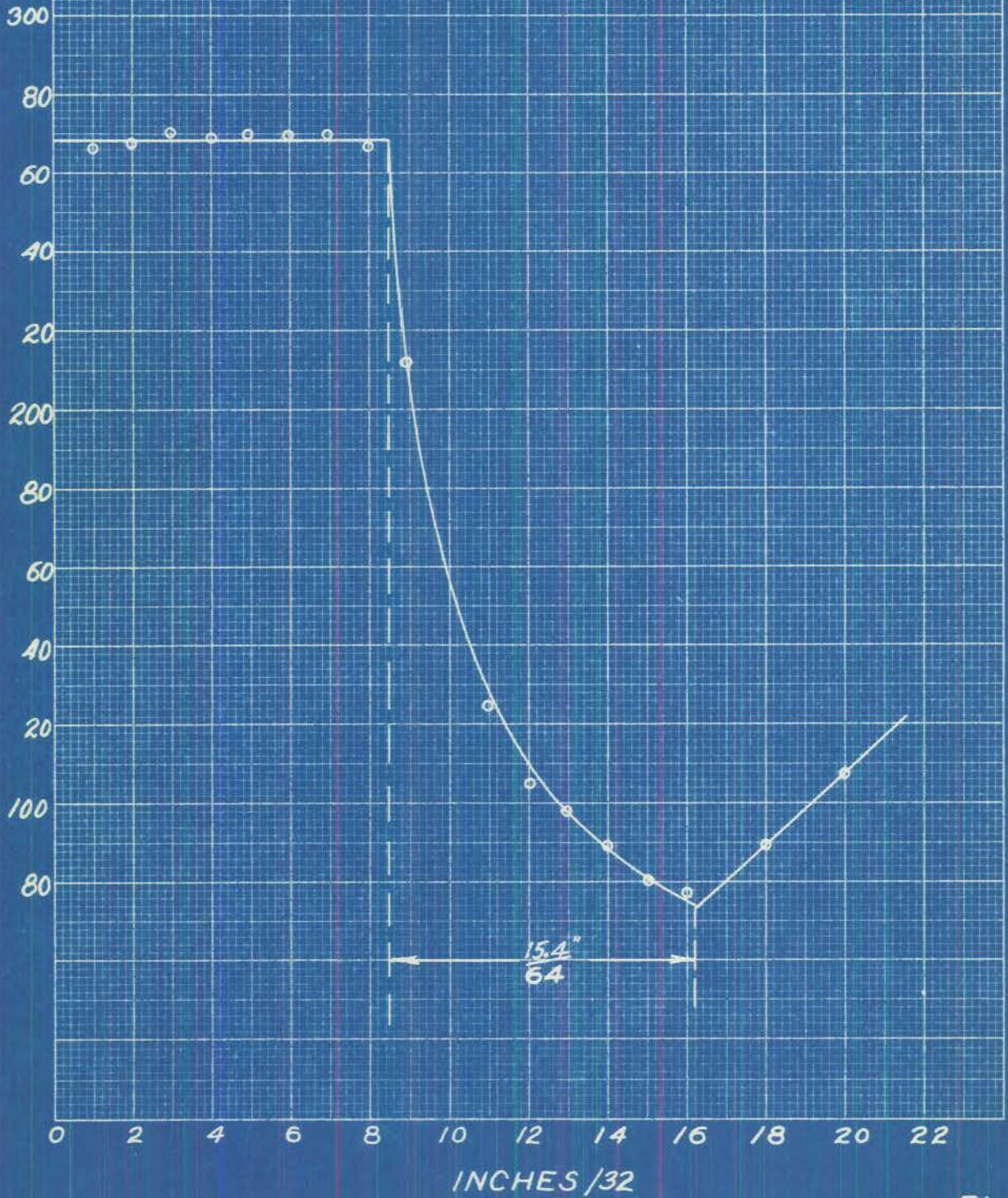
INTENSITY - COUNTS PER SECOND



STEEL PIPE - 4" DIAM $\frac{15}{64}$ " WALL

3 MILLIGRAMS OF RADIUM

INTENSITY - COUNTS PER SECOND



NO. 3110. 20 DIVISIONS PER INCH BOTH WAYS. 12.5 DIVISIONS PER INCH.

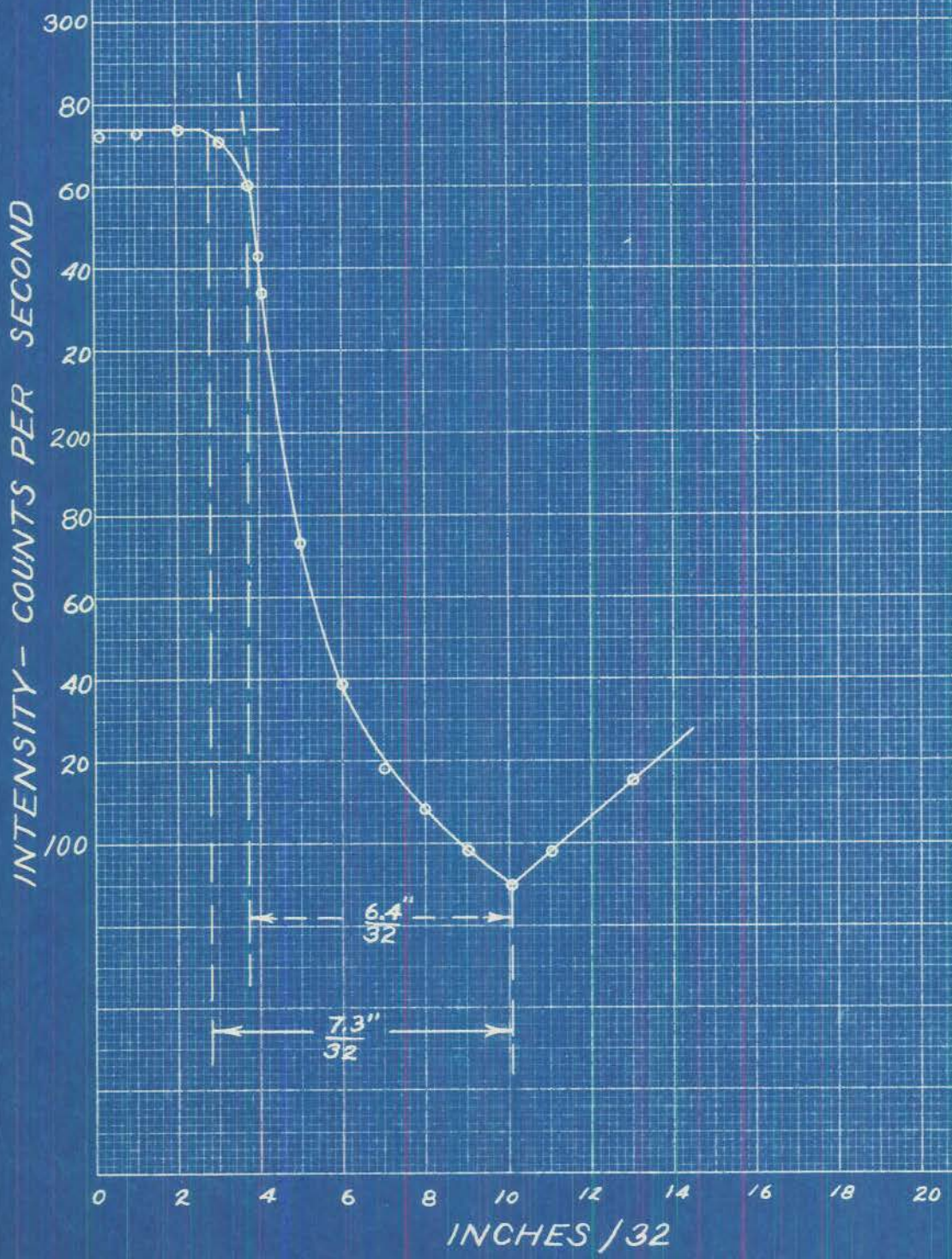


NO. 3110. 20 DIVISIONS PER INCH BOTH WAYS. 12.5 DIVISIONS PER INCH.

STEEL PIPE - 3" DIAM - PAINTED INSIDE

AND OUTSIDE - CALIPERED $\frac{7}{32}$ "

3 MILLIGRAMS OF RADIUM



CODING COMPANY, INC., NORWOOD, MASSACHUSETTS
PRINTED IN U.S.A.



NO. 3110. 20 DIVISIONS PER INCH BOTH WAYS. 160 DIVISIONS.



INTENSITY - COUNTS / SECOND

