
TWENTY-YEAR ATMOSPHERIC CORROSION INVESTIGATION OF ZINC-COATED AND UNCOATED WIRE AND WIRE PRODUCTS

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Fred M. Reinhart



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FOREWORD

Committee A-5 on Corrosion of Iron and Steel was organized in 1907, to investigate the corrosion of iron and steel. In 1908, Committee A-5 sponsored its first atmospheric exposure of metallic-coated wires to evaluate their corrosion resistance. There followed several extensive corrosion studies and in 1924 the committee initiated a broad exposure test program to include metallic-coated roofing sheets, hardware, wire and wire products, and various structural shapes. The wire test specimens were exposed in 1936 at eleven different locations throughout the country; data obtained from this study form the basis of this report.

The metallic-coated (zinc, copper, and lead) specimens were exposed in 1936 in the following numbers—plain, unfabricated wire: 10,010 tension test specimens and 432 weight specimens; barbed wire: 168 33-ft long specimens; wire strand: 360 10 $\frac{2}{3}$ -ft long specimens; farm fence: 560 16 $\frac{1}{2}$ -ft long specimens; and chain-link fence: 176 10-ft long specimens. Corrosion-resistant steel wire and wire products were also included.

The range of the zinc coatings was from 0.25 to 3.00 oz per sq ft of surface area. The corrosion rates of the zinc coatings varied from 0.326 oz per sq ft per year at Pittsburgh, Pa., to 0.022 oz per sq ft per year at Davis, Calif. The corrosion rates of the zinc coatings were linear with time of exposure, and the life of the zinc coatings was directly proportional to their weights, irrespective of the methods of applying the zinc coatings and the gage of the coated wire.

The rates of decrease in the strengths of the bare wires were linear with time of exposure and the same was true for the zinc-coated wires after the zinc coatings had disappeared.

There were no losses in the strengths of the corrosion-resistant, copper-coated, or lead-coated wires.

The details concerning the tests as set forth in this paper by Mr. Fred M. Reinhart, were approved by Committee A-5. The committee is pleased to have the paper appear as an ASTM Special Technical Publication.

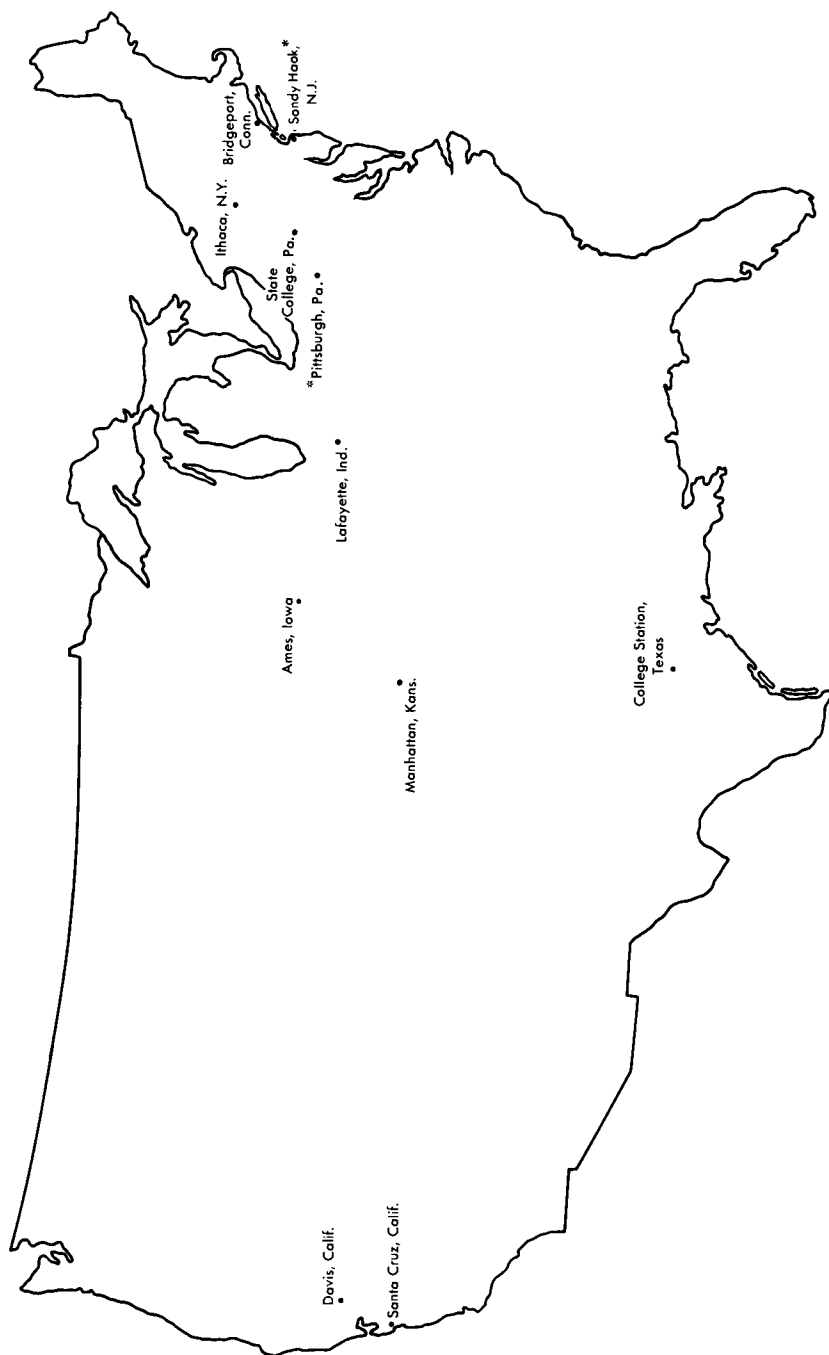


FIG. 1.—Exposure Test Sites Used for the Wire and Fencing Test Program.

* Pittsburgh, Pa.—Wire and fencing was exposed on Brunot Island in 1936. The corrosion-resistant, and copper-coated and lead-coated wire specimens only were moved to the U. S. Bureau of Mines in 1951, and in 1952 were moved to the roof of Williams and Co., North Pittsburgh.

* Sandy Hook, N. J.—Abandoned in 1952.

