

Examining Tower Guy Wire Anchor Rods

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Introduction

The use of tall towers as platforms for environmental, radiological, and meteorological monitoring equipment is common in the nuclear industry. Typically, guy wires and anchor rods are used to support the tower. These anchor rods extend below grade into a massive support such as a concrete block and must withstand a force of several tens of thousands of pounds to remain secure. In order to maintain a proper level of performance, these anchor rods should be examined periodically to ensure that the integrity of the rod is not compromised due to corrosion and/or stress related flaws that could result in failure of the rods. Corrosive environments due to dissimilar metals such as iron rods connected to or nearby copper grounding infrastructure and corrosive soil or concrete characteristics are commonplace and inherently damaging to anchor rods over time.

The "Problem"

Historically, inspections of the below grade portion of an anchor rod have been made by excavation and a visual inspection, however, this technique has several undesirable characteristics including the high level of labor involved, the incompleteness of the examination, and the difficulty of repeated examinations over time. Also, the removal of fill-dirt adjacent to the anchor rod may hinder the ability of the anchor block to maintain the proper design load during excavations. Nicks or scrapes into the protective coating of the rod during excavation may provide an avenue for future damage to corrosion. Visual examinations are acceptable for detecting fully developed flaws, but are inadequate for detecting cracks, internal flaws, or

any part of the rod encased in the concrete anchor block.

The SoundAnchor™ Solution

To avoid the potential complications cited above, an alternative examination method was developed to improve manpower efficiency, technical rigor, and cost effectiveness. The SoundAnchor™ (patent pending) nondestructive examination technique has been developed to determine the status of each individual rod by emitting energy through the entire length of the rod. Field test data from *in-situ* rods are compared to data obtained from a full-scale mock-up or calibration rod. Any deviation from the expected signatures is identified or, in the case of a fully intact rod, a favorable comparison to the calibration rod is made. SoundAnchor™ can also be applied to new anchor rods prior to installation. The manpower required to perform SoundAnchor™ is minimal compared to an excavation, and the examination can be readily performed at any time interval. An assessment of the entire length and interior of the anchor rod is made including any portion encased inside the anchor block. Trends in deterioration can be monitored over time by comparing a series of periodic inspections.

Cost Effectiveness

Costs associated with SoundAnchor™ have been shown to be one-tenth of typical excavations per each rod examined. In addition, SoundAnchor™ provides extensive information regarding the entire length of the rod—much more than is possible with a simple visual examination.

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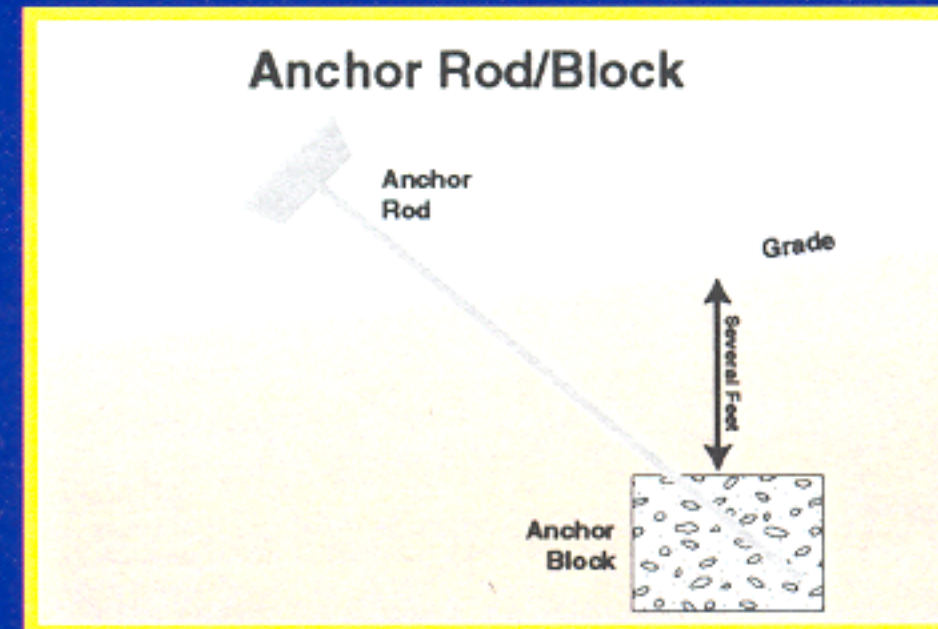
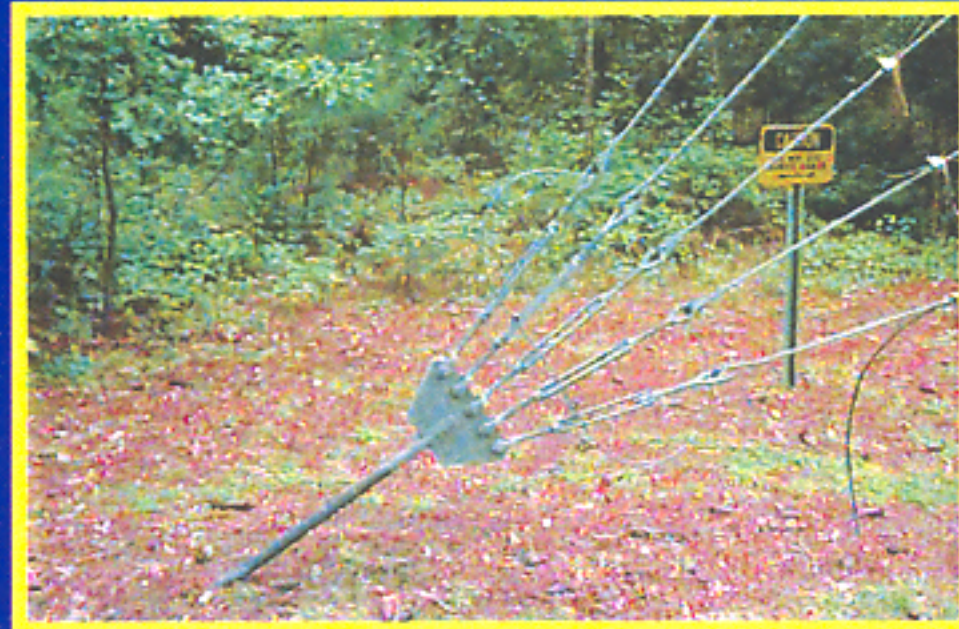
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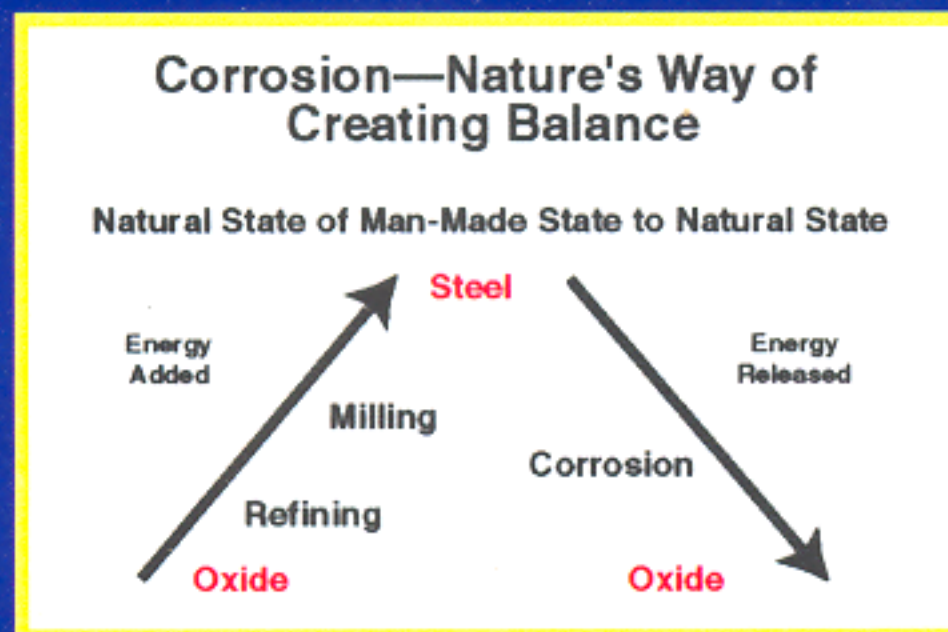
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Excavations—Should I dig?

Excavation—Common Industry Practice

Negative Factors

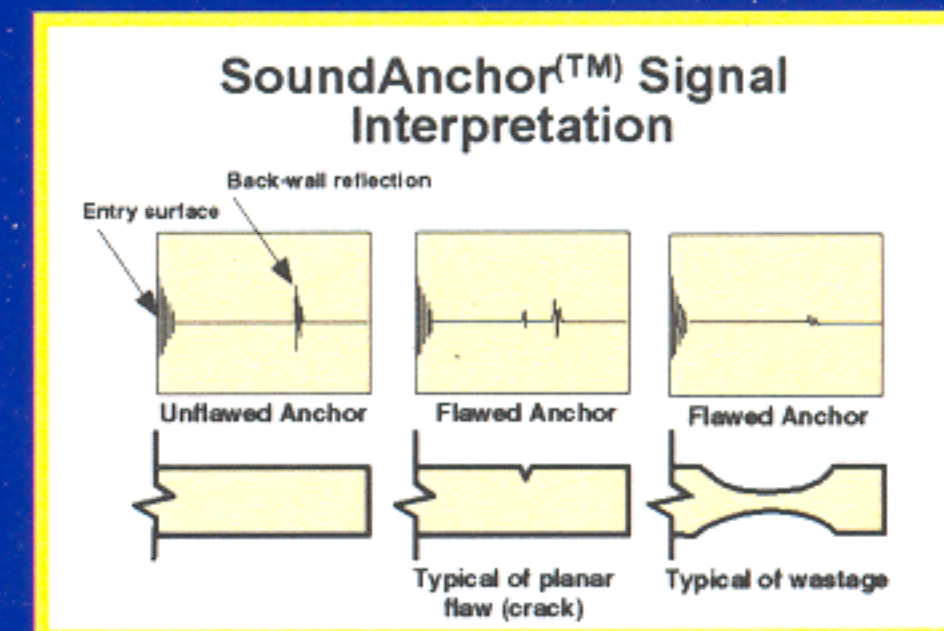
- Labor Intensive
- Inherently damaging
- Inadequate visual examination
- Safety compromised during fill removal
- Compliance with regulatory guidance for trenches
- Difficult to repeat

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Advantages

- After minor initial preparation, test conducted quickly
- Non-damaging
- More thorough examination
- Inherently safe
- Easily repeatable



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