

AnchorGuard

Corrosion Control System for Tower Anchors



Story of AnchorGuard



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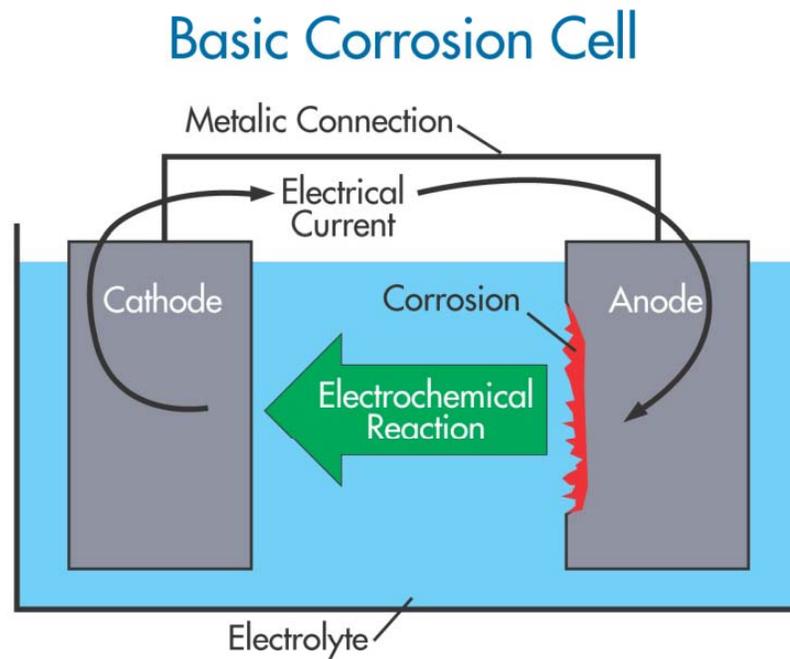
Story of AnchorGuard



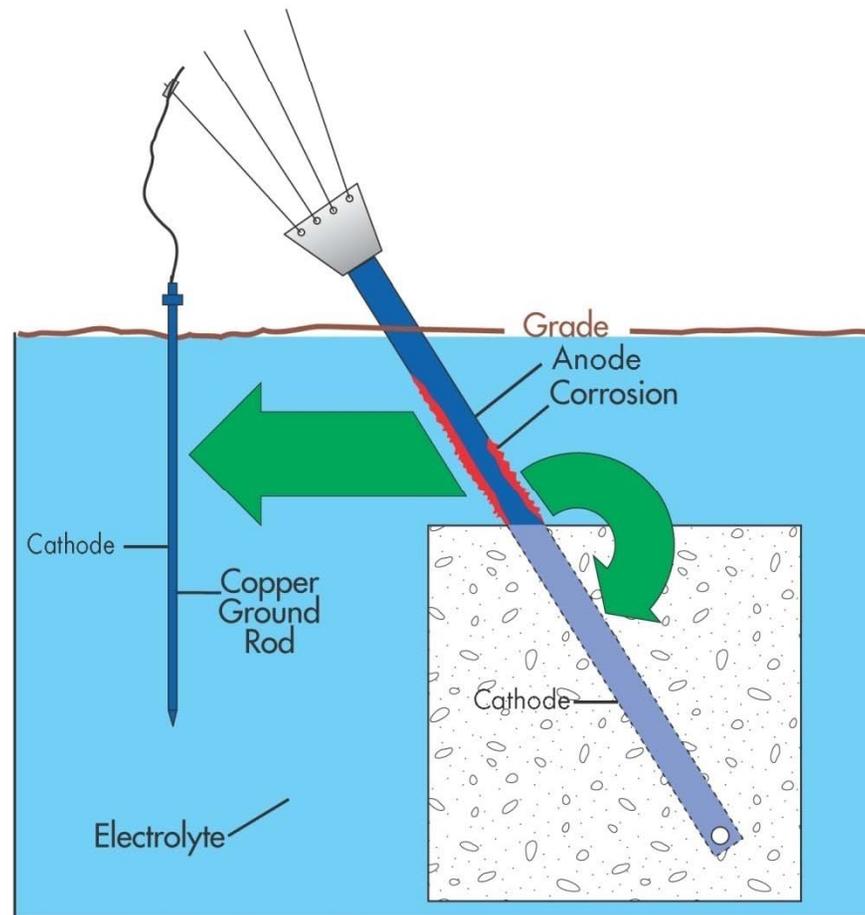
The Problem

- **Towers are designed for 50+ year service life**
- **Galvanization of surfaces in atmospheric conditions is usually OK**
- **Galvanization of surfaces below grade is often not enough**
- **Many anchors aren't protected with anything but galvanizing**

Basic Corrosion Cell



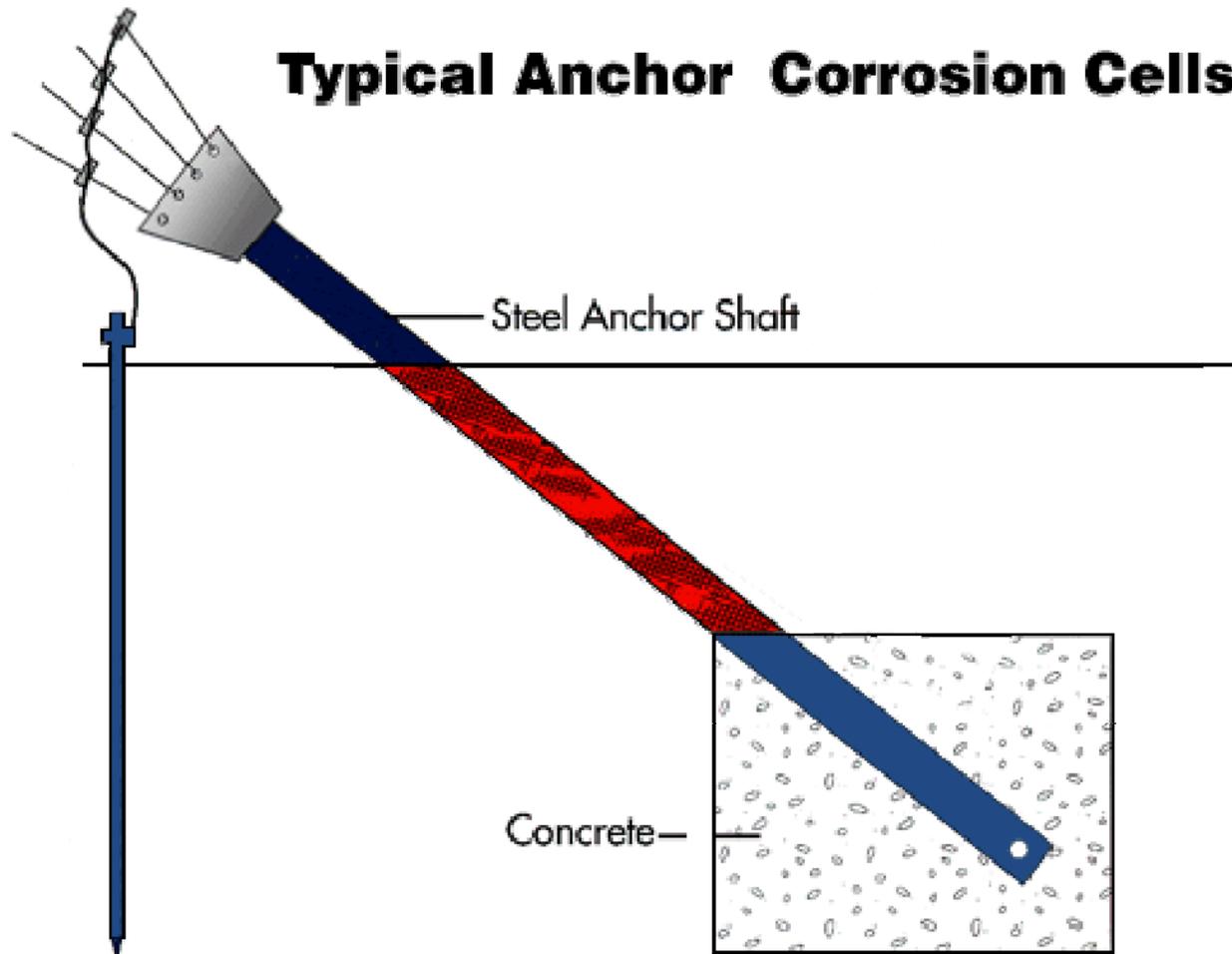
Typical Guy Anchor



Typical Anchor Corrosion Cells

Galvanic Corrosion

Typical Anchor Corrosion Cells



Why Does Galvanizing Work Sometimes?

- **It all depends on the soil type**

Soil Classification

■ Soil resistivity is the key measure

Soil Resistivity Classification - TIA 222G Appendix H

<u>Resistivity in ohm/cm</u>	<u>Category</u>
■ 0 – 5,000	Very Corrosive
■ 5,000 – 10,000	Moderately Corrosive
■ 10,000 – 25,000	Mildly Corrosive

Resistivity below 1,000 ohm/cm is likely to cause rapid corrosion of the guy anchor

What About Existing Towers

- **Soil resistivity can give a clue if there could be a problem**
- **Age of the tower is another clue**
- **But investigating the anchor below grade is the only sure way of knowing if damage has occurred**

Why Is This A Big Deal?

- **Life safety of climbers**
- **Life safety of the public**
- **Liability to renters**
- **Loss of revenue**
- **Loss of good will**
- **Replacement cost**

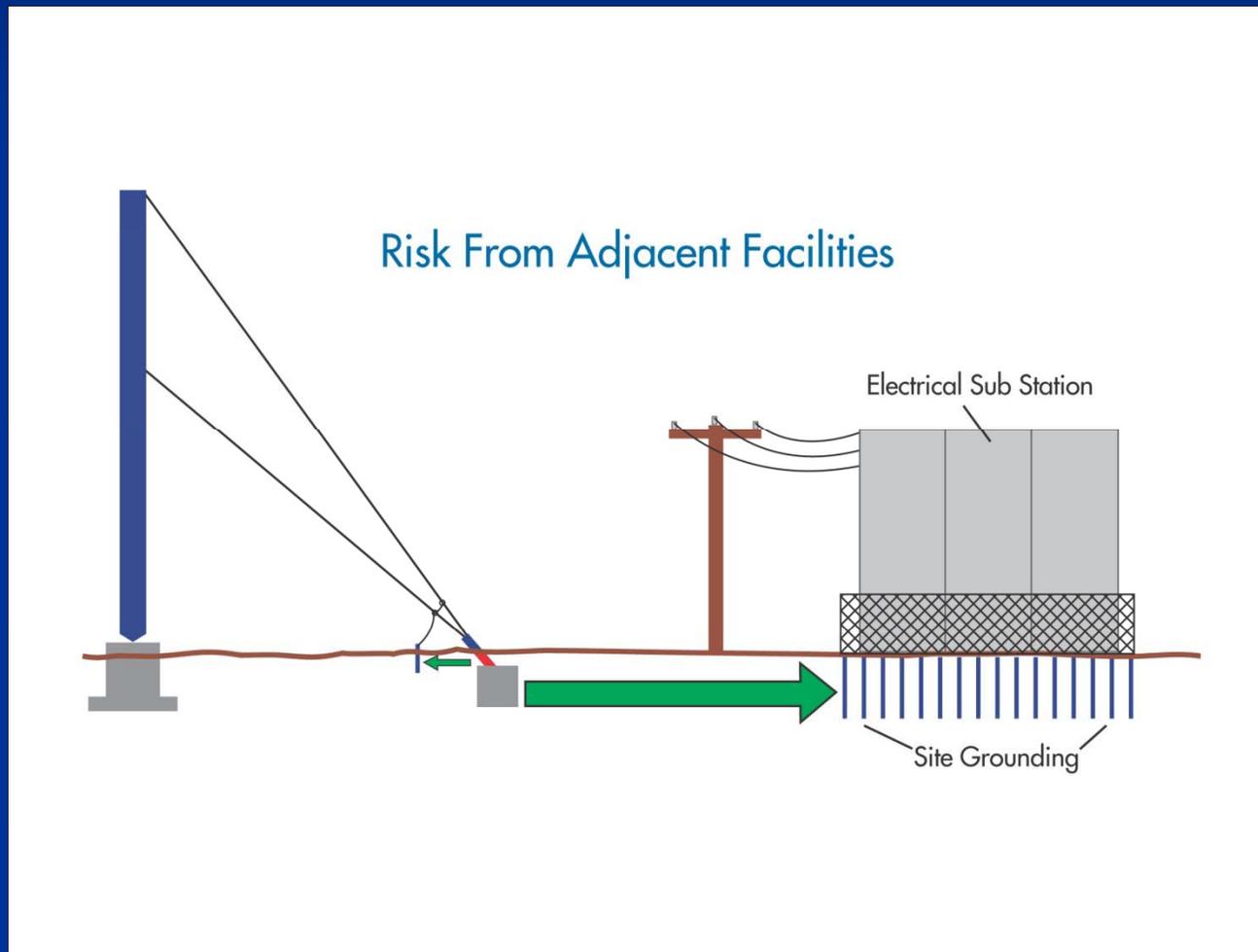
Are There Other Risks?

- **Electrical Sub Stations**
- **Buried pipelines**
- **Extensive copper grounding**

Proximity to Major Utilities



Proximity to Electrical Substation



Does Corrosion Rate Vary?

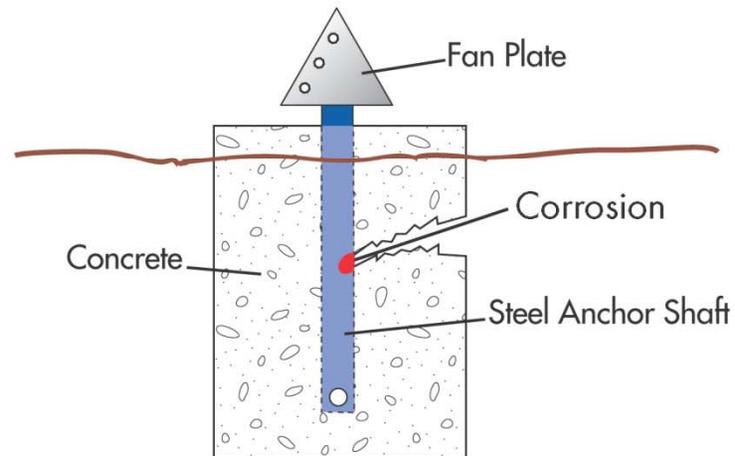
- **Rate increases where moisture is present**
- **Rate increases where soluble salts are present**
- **Dissimilar soils can increase corrosion**
- **Frozen ground stops corrosion, but not below frost line where it accelerates during frost**

Am I Safe With Concrete Encasement?

- **Generally speaking yes**
- **But there are potential risks**

Concrete Encasement Risk

Concrete Encasement



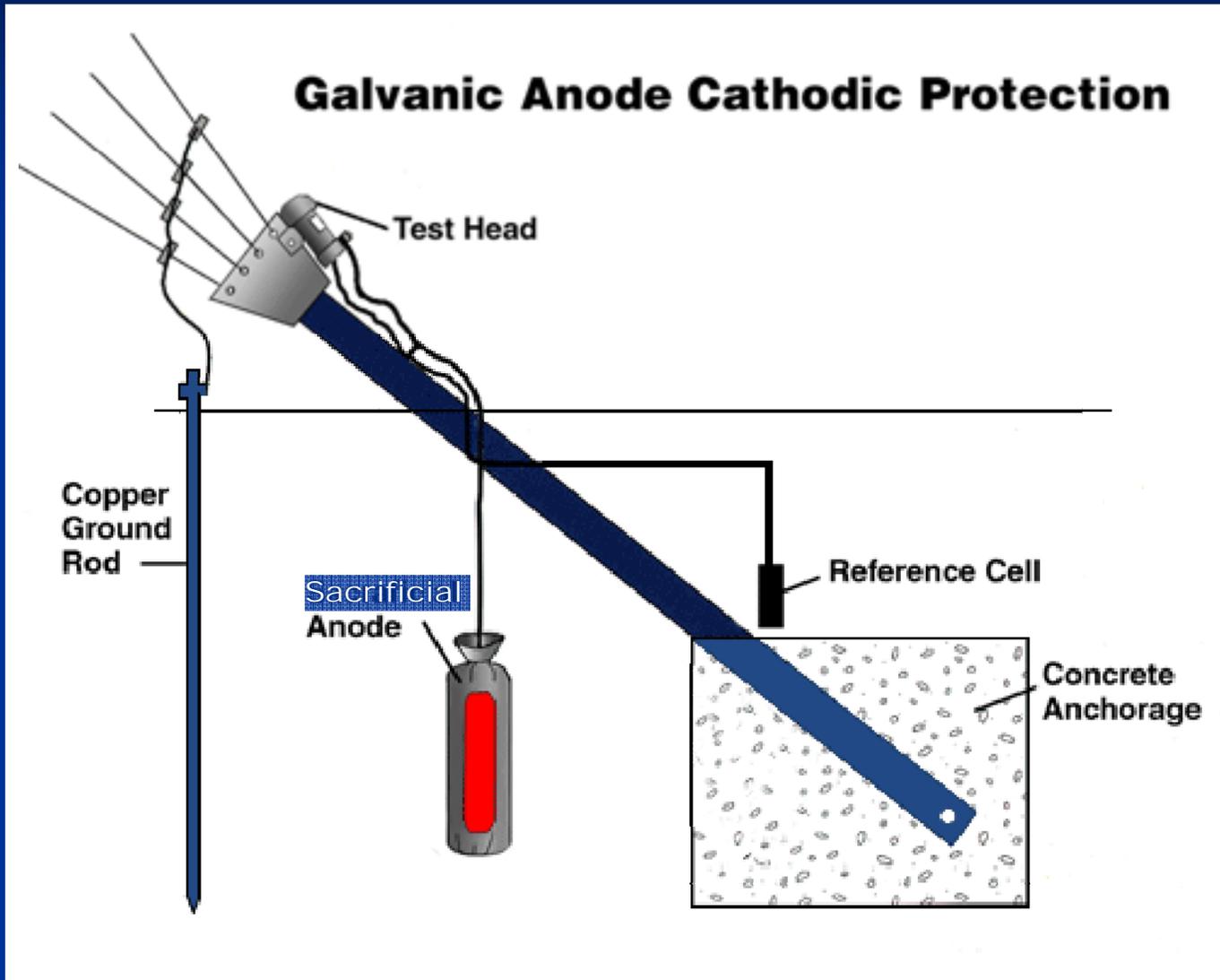
Concrete Encasement



What About Cathodic Protection

- **Cathodic Protection covers all the variables of a corrosion cell**
 - **Soil type**
 - **Dissimilar soils**
 - **Copper grounding**
 - **Frozen soil**
 - **Sub stations and pipelines**
- **It requires testing and replacement**

Cathodic Protection



Dig to Block Inspection

- **Visual investigation or “dig to block” is my best recommendation**
- **Testing soil can be helpful**
- **Other methods**

Inspecting Existing Anchors

- **Determine when to climb or when to request Dig To Block inspection**
- **See flow chart**

Rating Corrosion Severity

- **Corrosion Severity Factor 1 (CSF 1) includes the following:**
 - **Galvanizing in tact, no signs of rust, no cross sectional material loss. Anchors rated CSF 1 should be monitored during regular tower inspections.**

CSF 1



CSF2

- **Corrosion Severity Factor 2 (CSF 2) includes any of the following:**
 - **Galvanizing is compromised, rust spots prevalent, but no cross sectional material loss. Additional corrosion control is highly recommended.**

CSF2



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CSF3

■ **Corrosion Severity Factor 3 (CSF 3)**
includes ANY of the following:

- **Galvanizing is gone, heavily corroded, deep pitting or areas of flaking, measurable cross sectional material loss. Additional corrosion control is required.**

CSF3



Can I Dig the Top Portion of the Shaft and Know What is Below?

- Not in my experience

Why Dig To Block

Colorado City TX Video

Anchor Inspection

Anchor inspection video

Anchor Failed During DTB



Tag Anchor After Inspection

DIG TO BLOCK ANCHOR INSPECTION

DATE CONDUCTED

CORROSION SEVERITY FACTOR

- NO RUST, NO MATERIAL LOSS
- SURFACE RUST, NO MATERIAL LOSS
- RUSTING, FLAKING, MATERIAL LOSS
- <10% ≥10%

DO NOT CLIMB

NEW ANCHORS INSTALLED

SIoux FALLS TOWER & COMMUNICATIONS 605-331-6972

Even New Towers are at Risk



Archer City, TX

This tower was 5 years old. It was part of an anchor study program.

AnchorGuard Installation



AnchorGuard Installation

1. APPLY COATING TO ANCHOR SHAFTS *(Optional)*



ATTENTION!

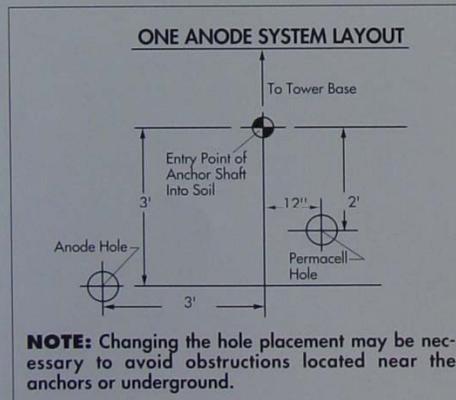
Coating the anchors is not required. Anchor coating will however act to enhance system effectiveness and life. Follow manufacturers instructions listed on coating can to determine how coating is to be applied.

The anchors can be coated either before being installed or after being installed, but before being back-filled. Be sure to thoroughly clean the anchors of all foreign materials before applying the coating. Follow closely the manufacturers instructions in applying the coating. Be sure to completely coat the entire shaft from the point where it exits the concrete to where the shaft meets the anchor fan-plate. Let the coating adequately cure before back-filling the anchorage. Take care to avoid excessive damage to the coating during the back-fill process.

2. BORE HOLES FOR ANODE PLACEMENT

MODEL AG1

Using an auger with an 8-inch bit, bore 1 anode hole 6 feet deep. Refer to **Figure 2** for exact hole placement.



MODEL AG2

Using an auger with an 8-inch bit, bore 2 anode holes 6 feet deep. Refer to **Figure 3** for exact hole placement.

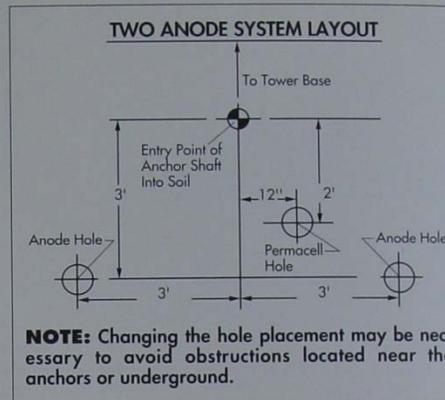
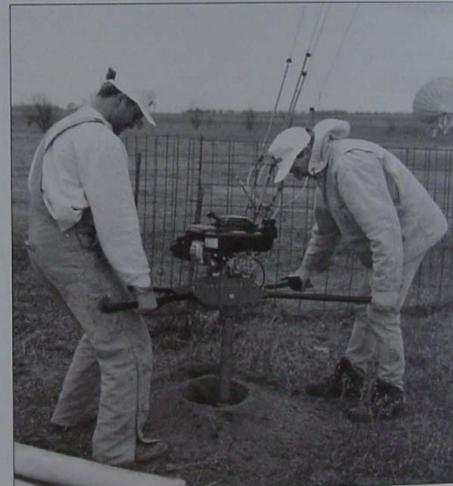


Figure 3



MODEL AG3

Using an auger with an 8-inch bit, bore 2 equally spaced forward and 1 rear anode hole 6 feet deep. The front two holes should be approximately 3 feet on either side of the anchor centerline. The rear hole should be approx-

AnchorGuard Installation



AnchorGuard Installation



AnchorGuard®

Corrosion Control for the Tower Anchors

