TECHNICAL BULLETIN
September 2005

Tower Failure from Anchor Corrosion

At 7 a.m. on Nov. 2nd 2003 a 180-foot, guyed tower collapsed in winds of less than five miles per hour, falling across a state highway. An audit crew had been climbing on this tower just a few months prior and had reported the above ground structure to be in "good condition."

Structural analysis revealed the tower was only at 70 percent of its design load. What happened? An anchor failed due to advanced corrosion six feet below grade.

AnchorGuard, with the assistance with PB Telecom, investigated the site revealing that the north guy anchor shaft had corroded to a thickness of less than half an inch, a discovery that has implications for many guyed tower owners and operators across the United States

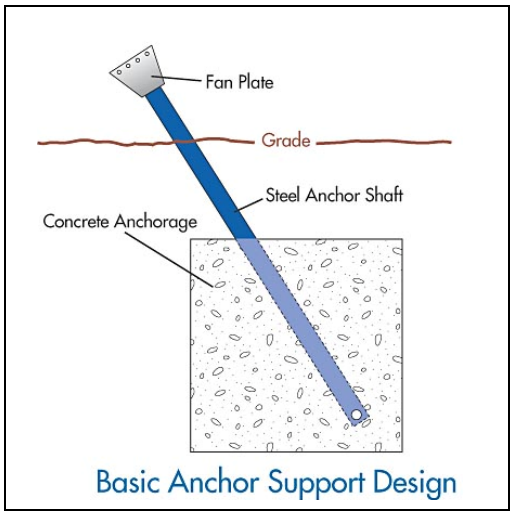
Subsequent investigations throughout the US have revealed that many towers are at risk of collapse long before the end of their design life because of the unexpected accelerated corrosion of the guy anchor shafts. In response to this urgent problem AnchorGuard has developed an innovative corrosion control system designed to protect tower anchors. The company has teamed up with PB Telecom to identify at-risk facilities, evaluate the rate of corrosion and assess the structural integrity of each tower.

Even though this problem may seem random and intermittent, more and more towers are failing or anchors are requiring replacement across the US due to this problem. In fact, in 2005 alone, AnchorGuard has been called to investigate two tower failures for two different tower owners and countless others with severely corroded anchors where emergency replacement was required. Thankfully no one was climbing on the failed towers when they came down.

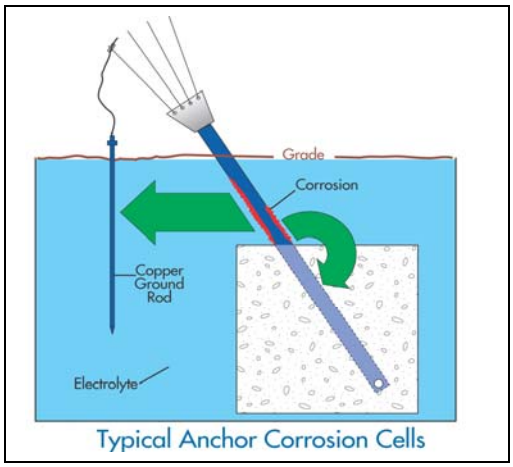
The tower pictured at lower right held twenty-seven T-1 lines and was a key link in a major microwave backbone network. Estimated cost to tower owner…a couple hundred thousand dollars. Estimated cost to the carrier in lost service/revenue…unknown.

Failed Anchor – August 2005, California

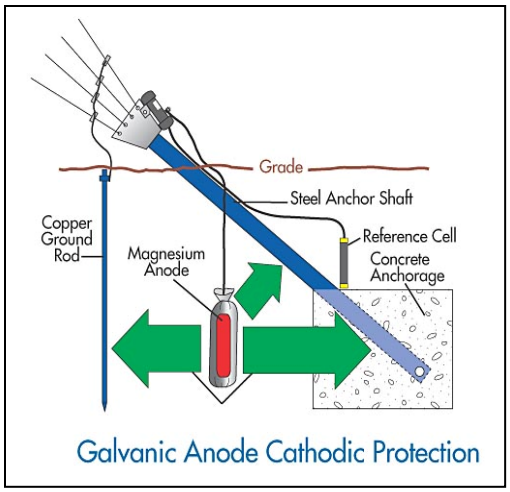
Preventing Disaster



Basic Anchor Support Design



Typical Anchor Corrosion Cells



Galvanic Anode Cathodic Protection

Guy Anchor Shaft Corrosion

- Corrosion is the process whereby the iron atoms in steel oxidize, and the steel returns to its native state.
- All steel guy anchor shafts start to corrode once they are placed in the ground.
- The rate of corrosion is affected by moisture, temperature, aeration, electrical conductivity and pH.
- TIA 222-G, the standard for antenna support structures, mandates regular inspections of the guy anchor shafts.
- The condition of the anchor shaft 12 inches below the ground (a typical depth for most current inspections) is not an accurate predictor of the level of corrosion along the entire shaft.
- The rate of corrosion can be drastically slowed if not stopped by the installation of a cathodic protection system, which uses a "sacrificial anodes."

The Problem

- Guyed towers throughout the US are at risk due to accelerated deterioration of the guy anchor systems.
- Sites favored by the wireless industry tend to have soils with high electrical conductivity.
- Guyed towers create a corrosion cell by placing different metals in close proximity i.e. copper grounding rods and steel anchor shafts.

The Solution

- Develop a plan to target towers most at risk to perform inspections and document the condition of the anchors. Inspections should be done by an experienced contractor.
- Install a corrosion control system to inhibit corrosion on both new and existing structures.
- Regularly monitor the corrosion control system.

For more information, contact:

ANCHORGUARD®
CORROSION CONTROL SYSTEM FOR TOWER ANCHORS

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