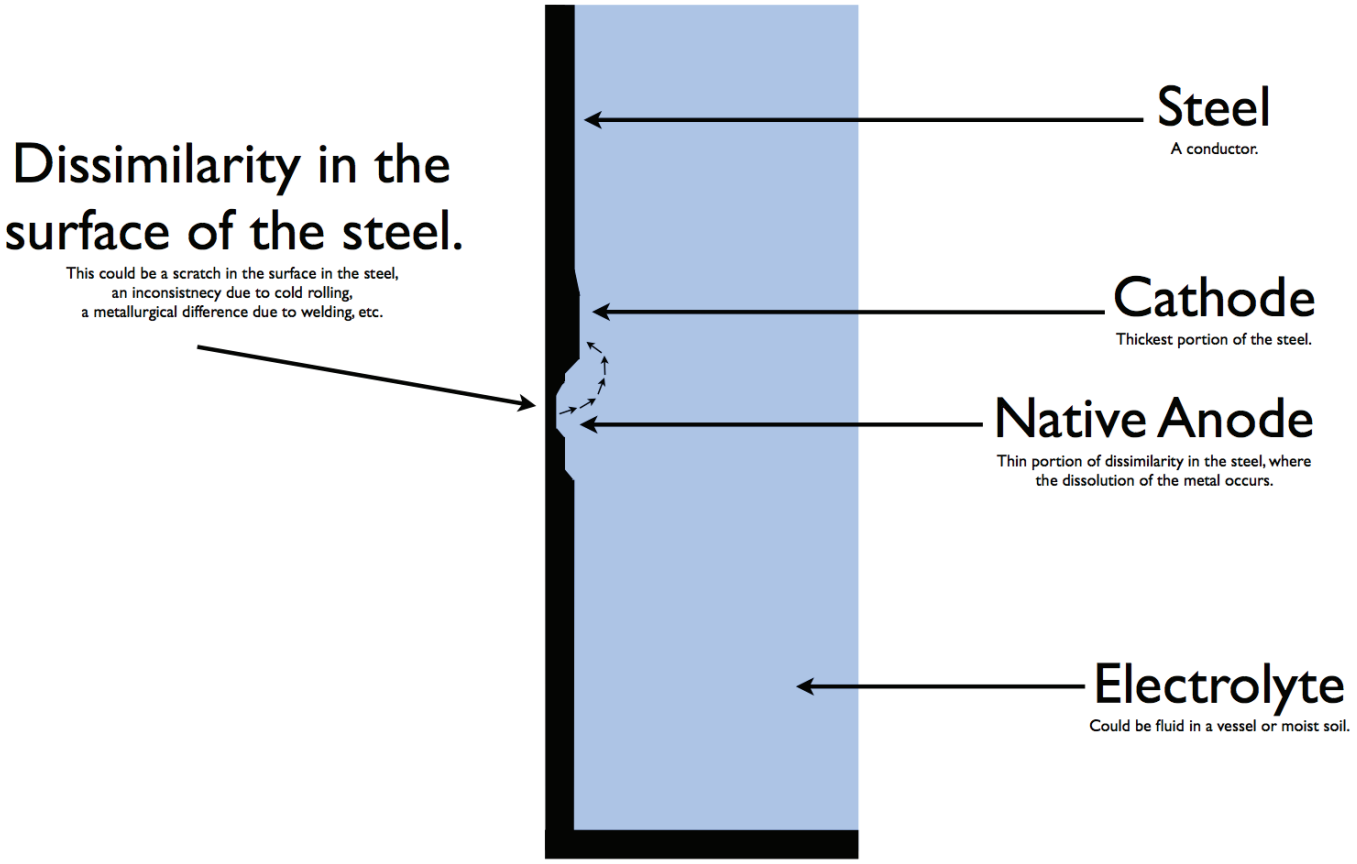
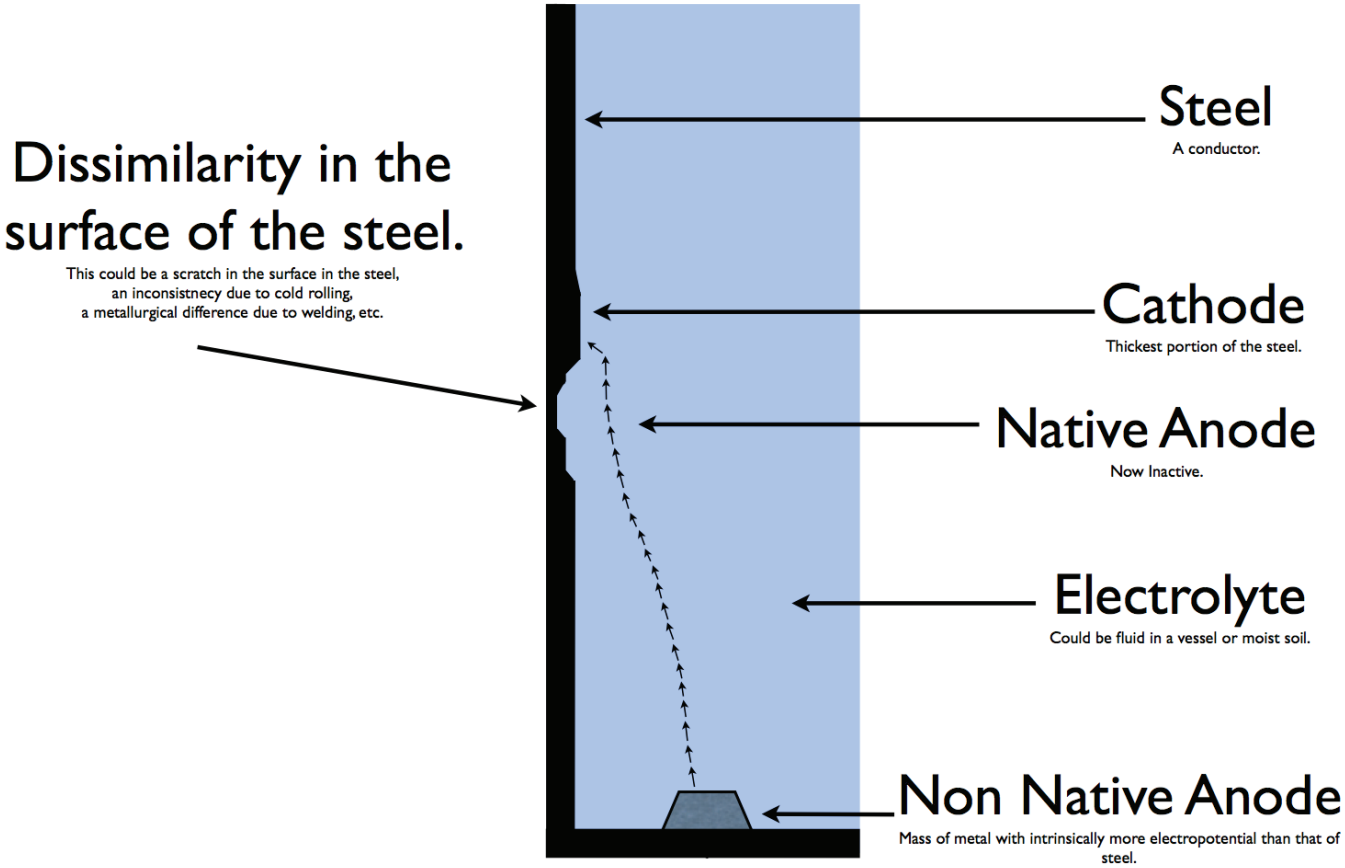
This paper is intended to simply explain how a sacrificial anode works.

An anode is a tool used to prevent electrochemical corrosion. Electrochemical corrosion is the process of man made metal (steel) returning to it's natural state (iron). Four components are required for this type of corrosion to occur: a conductor, a cathode, an anode (native anode), and electrolyte. Below is a diagram showing each of these components



Electrical current naturally flows from an anode, through electrolytes, to a cathode. The small arrows in the above diagram depict the movement of this current. During this process, molecules are removed from the anodic section of the steel surface. The result is a continual thinning of the anodic portion of the steel, eventually resulting in a leak.

Electromechanical corrosion of the steel can be prevented by introducing a foreign (non-native) anode to this process. Below is the same illustration with a non-native anode introduced.



As previously stated, electrical current naturally flows from an anode, through electrolyte, to a cathode. By introducing a non-native anode (made from metal with greater electro-potential than steel) molecules can flow from the non-native anode, instead of from the anodic portion of the steel surface (native anode). This is depicted by the small arrows on the diagram. In other words, the non-native anode will now corrode instead of the steel surface.

It is important to note that electricity only flows through a complete circuit. In the original drawing, the anode and cathode were electrically connected through the steel itself. When a foreign anode is introduced, electrical current must be able to flow from the anode, through the electrolyte, to the cathode, and back to the anode. To accomplish this, the anode must be physically grounded to the steel structure. This is usually done with a ground wire.