VLA Electronics Memo No. 226

National Radio Astronomy Observatory

Cathodic Protection of the VLA 60 mm Waveguide

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A corrosion survey of the underground waveguide at the VLA was conducted in May of 1980 and completed in March of 1981. At that time a recommendation was made by Pacific Corrosion Research, Inc. that a cathodic protection system be installed. Due to the high current demand and the cost, it was unfeasible to consider the sacrificial anode so the impressed current system was installed.

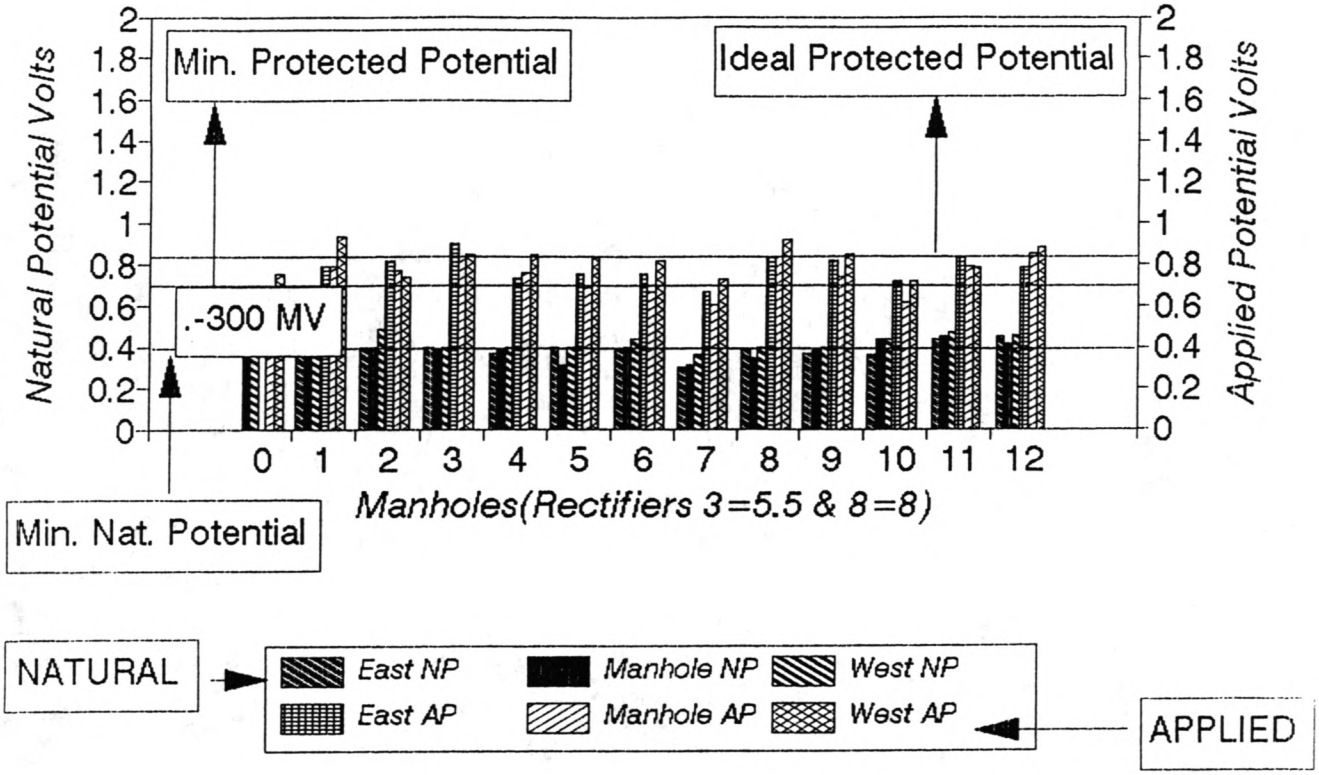
Common criteria for protection of the steel from corrosion required a minimum of -300 millivolts and an ideal of -800 millivolt potential relative to natural potential. The waveguide-to-soil natural potential ranged from -400 mv to -600 mv on the north and east arm. The west arm natural potential from A0 to A7 was in the range of -400 mv to -500 mv while the potential reading from W8 to W38 was in the range of -100 mv to -200 mv.

The consultant calculated that the total current required to give us minimum protection would be 228 amperes. This calculations was done on seventy-two observing stations, ~60km of 60mm underground waveguide and the track rail. The cathodic protection system consists of 11 air cooled rectifiers, 186 each 4" x 40" graphite anodes, 35 each 4" x 4" x 56 magnesium anodes. The magnesium anodes were used in several areas, such as road crossings, and some underground tanks. The underground tanks have since been removed.

The first set of graphs show the 1980 natural potential versus the 1984 applied potential and the 1980 natural potential versus the 1990 applied potential. The second set show the 1990 applied potential versus the 1993 and 1995 applied potential. All of the graphs show the minimum protection and the ideal protection. It was not until 1990 that we started to get into the ideal protection area. This was due to prevention maintenance and upgrading of the anode bed watering system. You'll also see that at each rectifier the potential goes high then tends to drop off with distance, and this is due to the high current that has to be applied to get the protection required at the end of each arm.

Applied Versus Natural Potential

East Arm 1980 Natural and 1984 Applied



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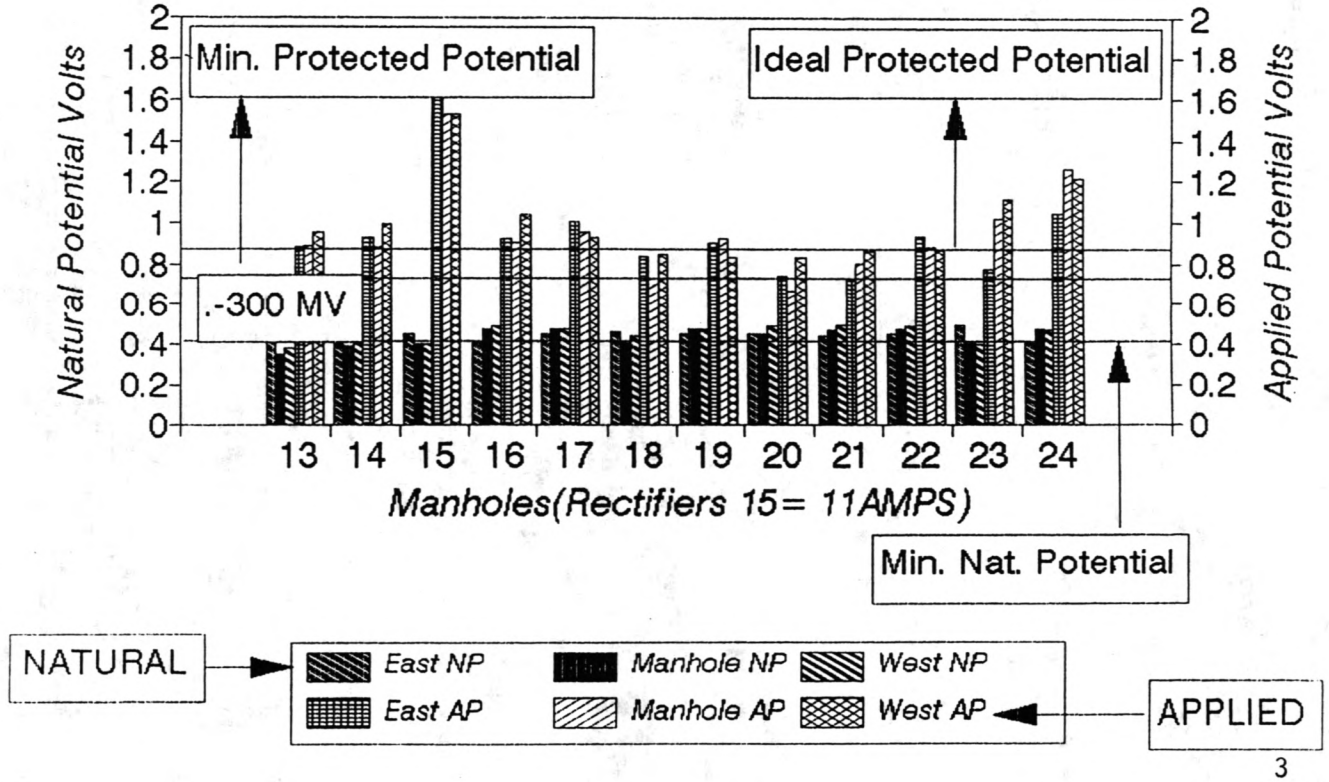

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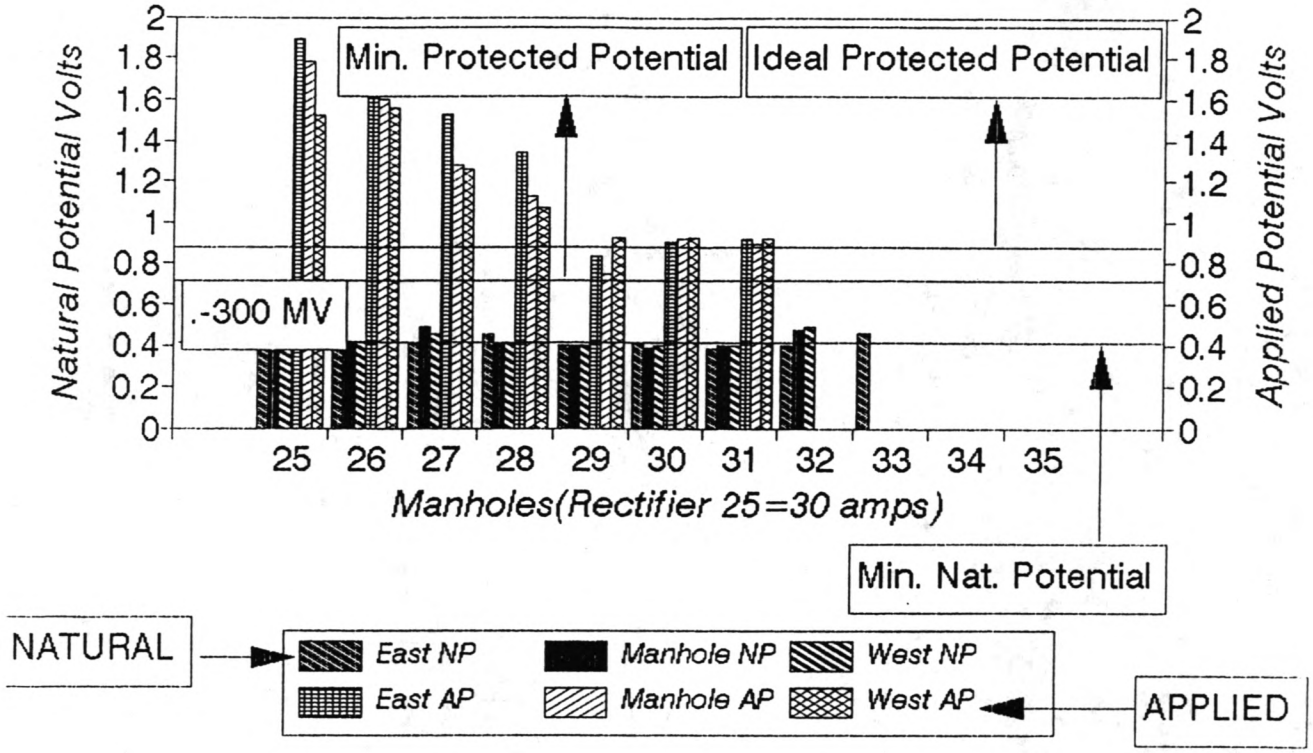

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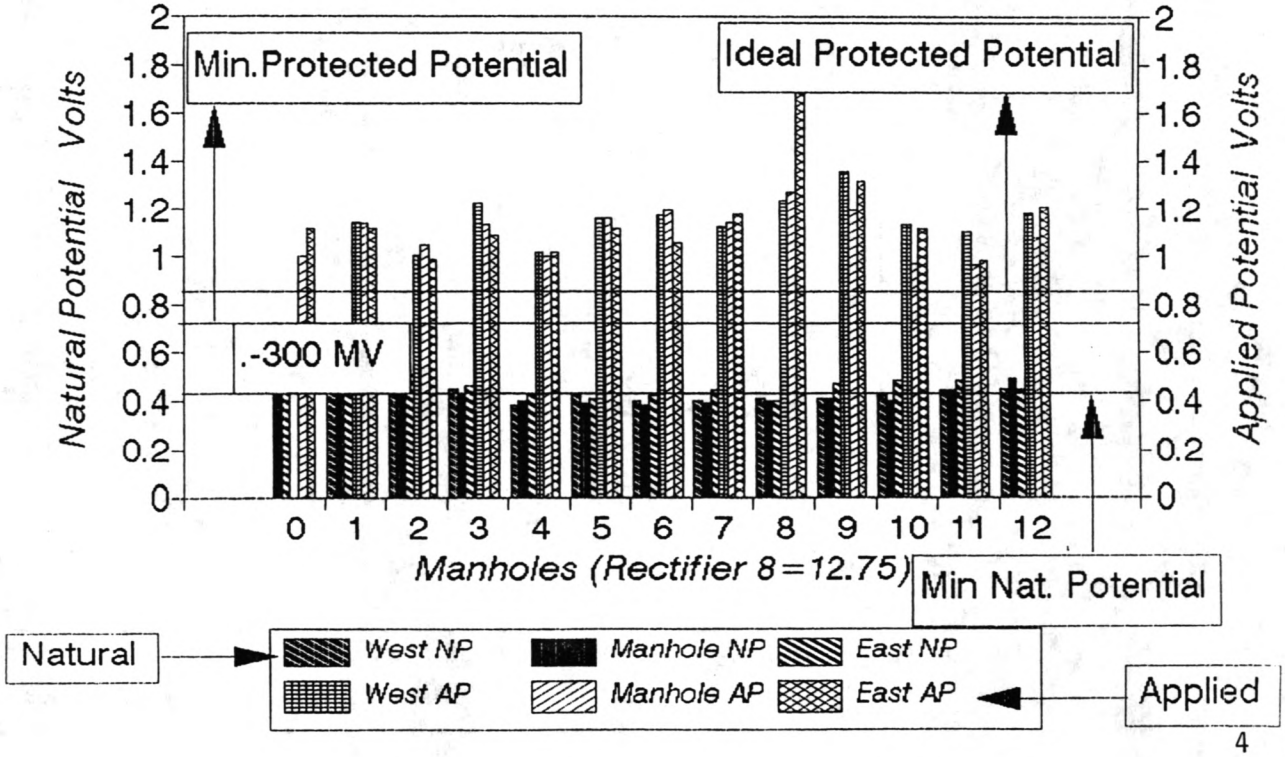

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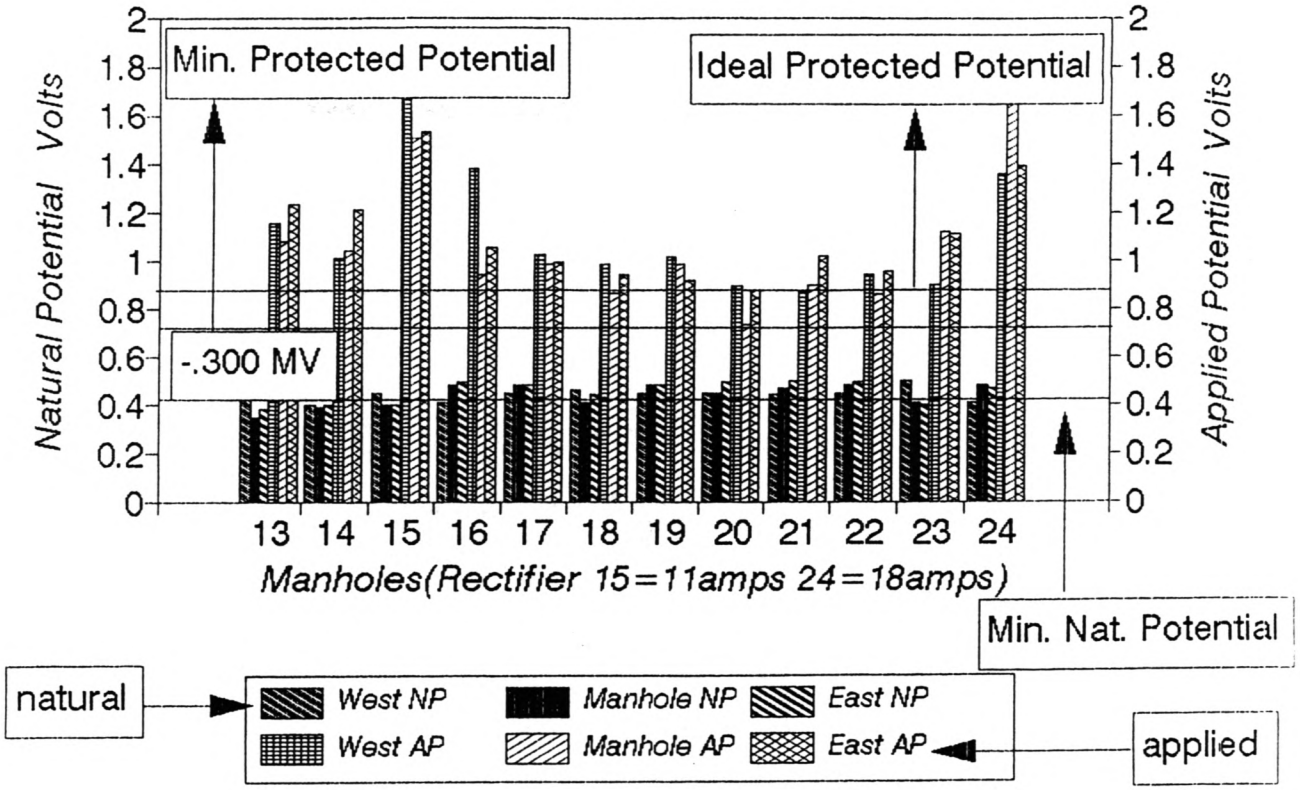

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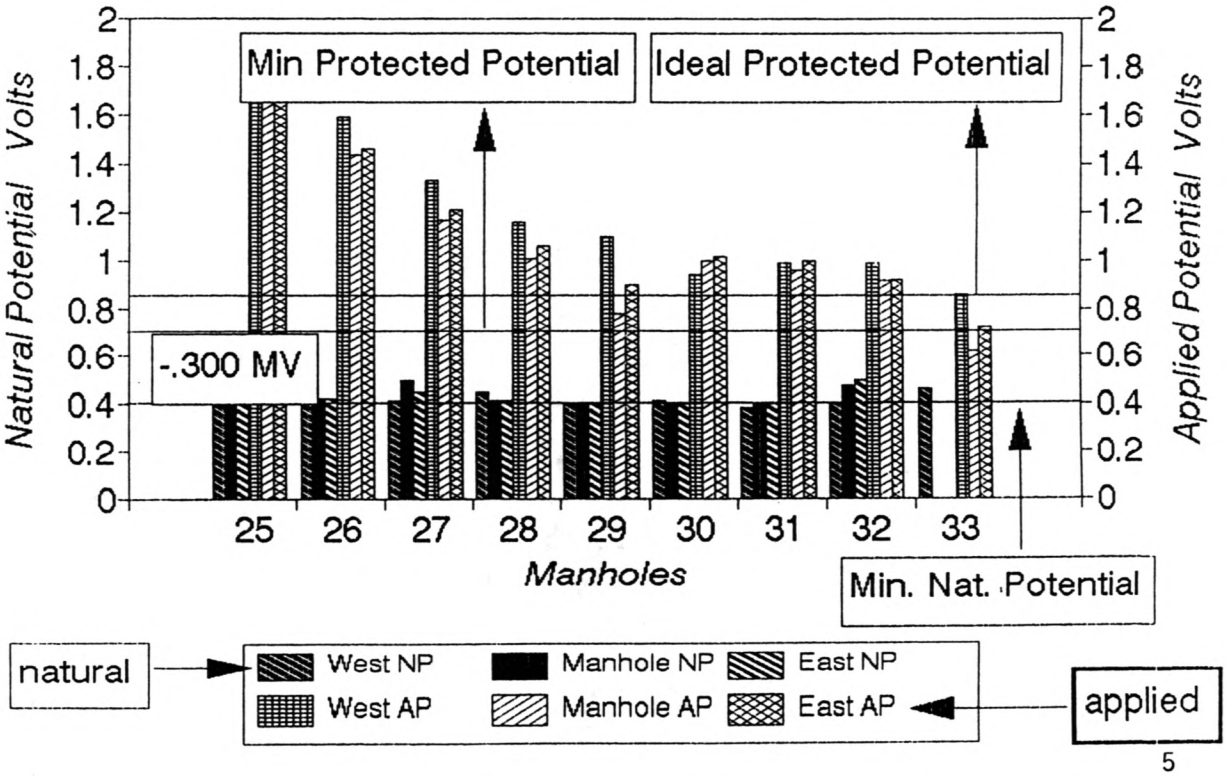

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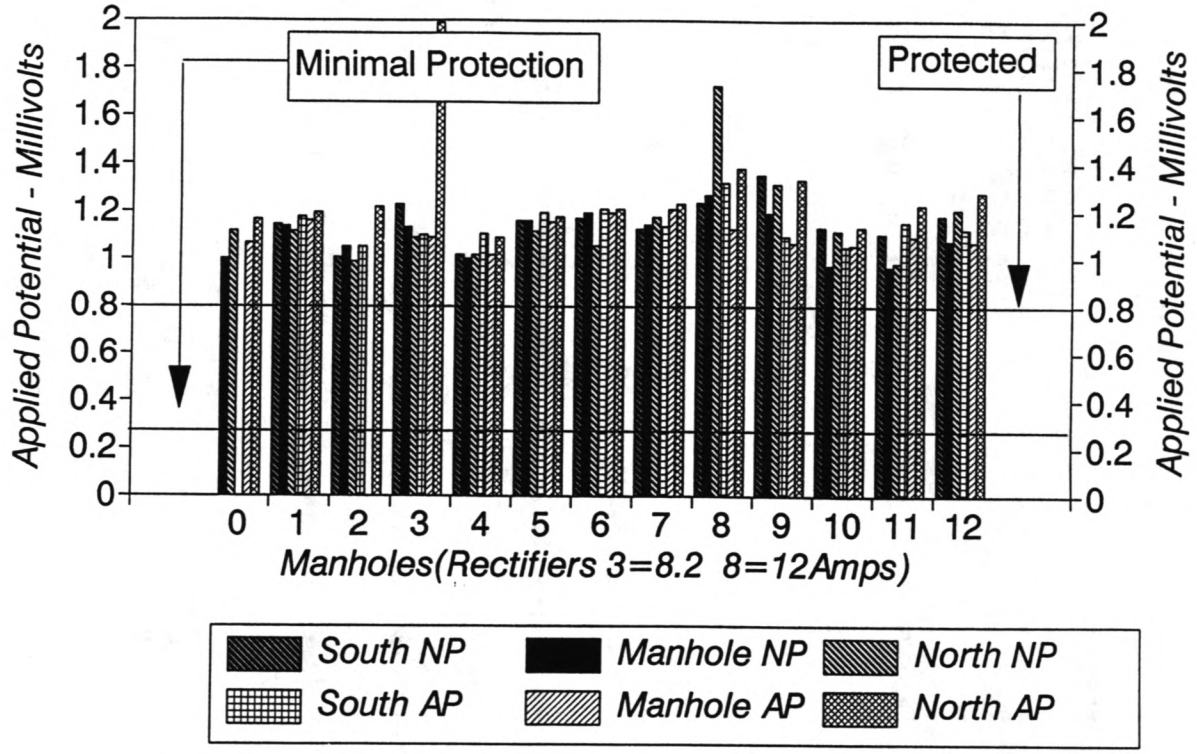

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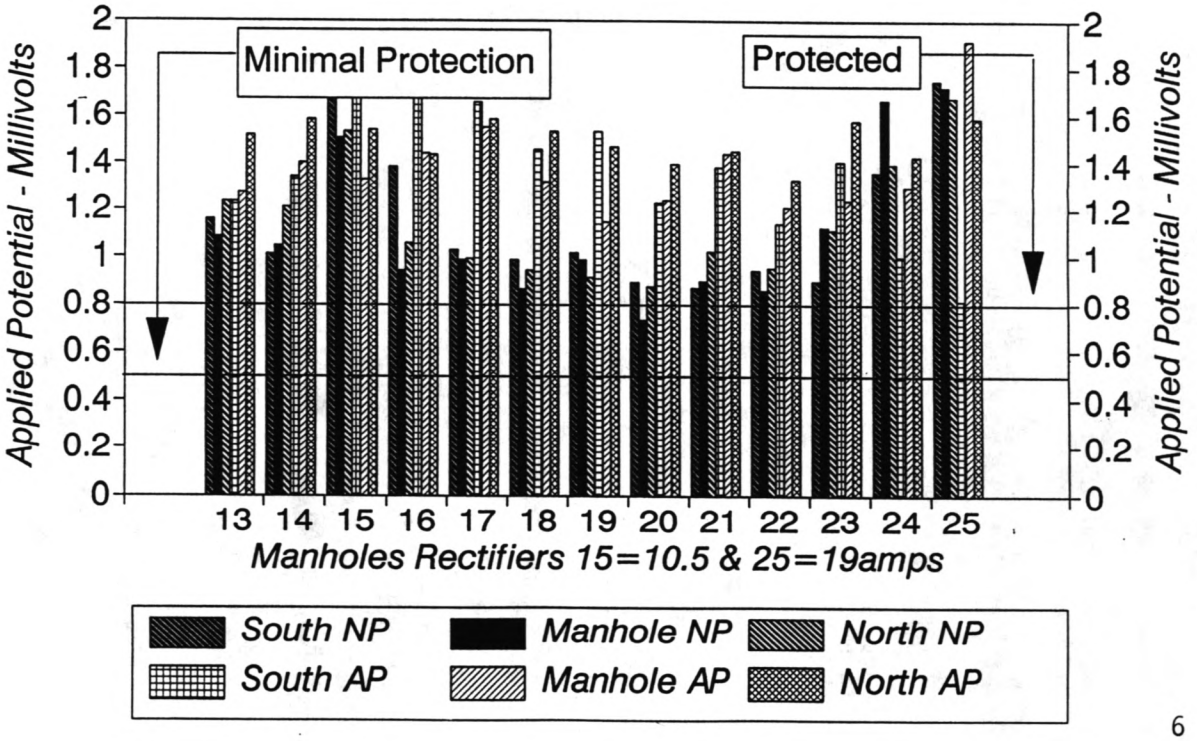

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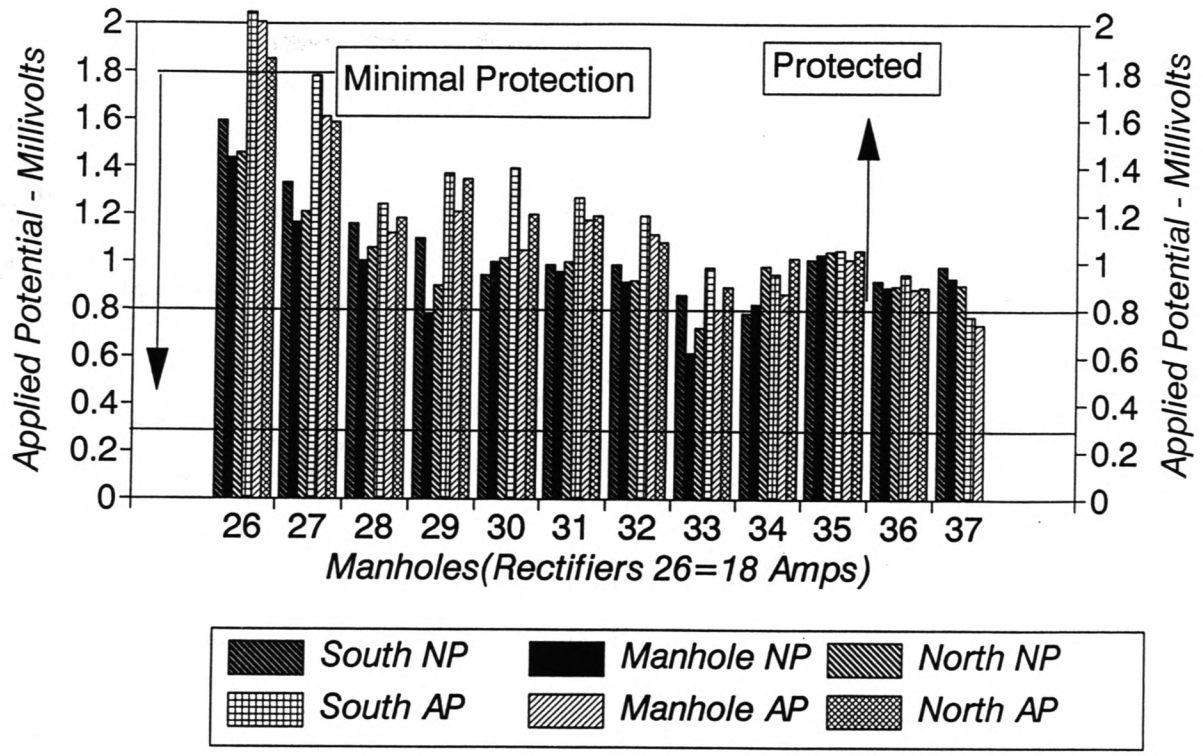

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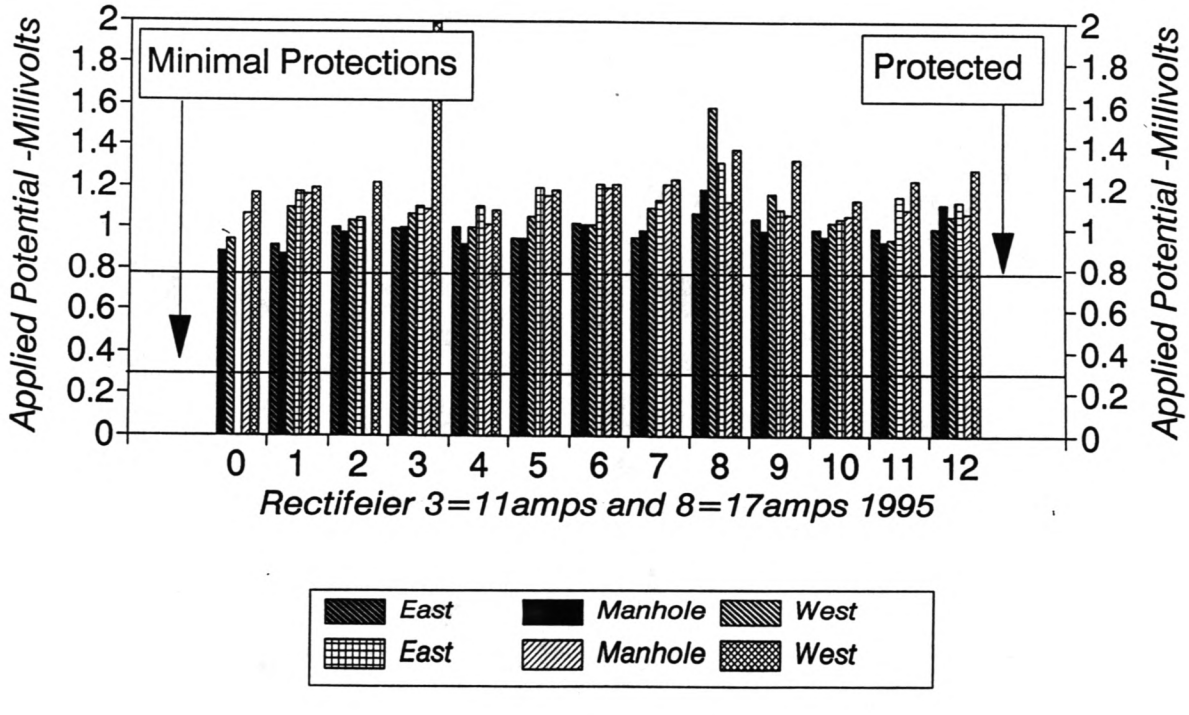

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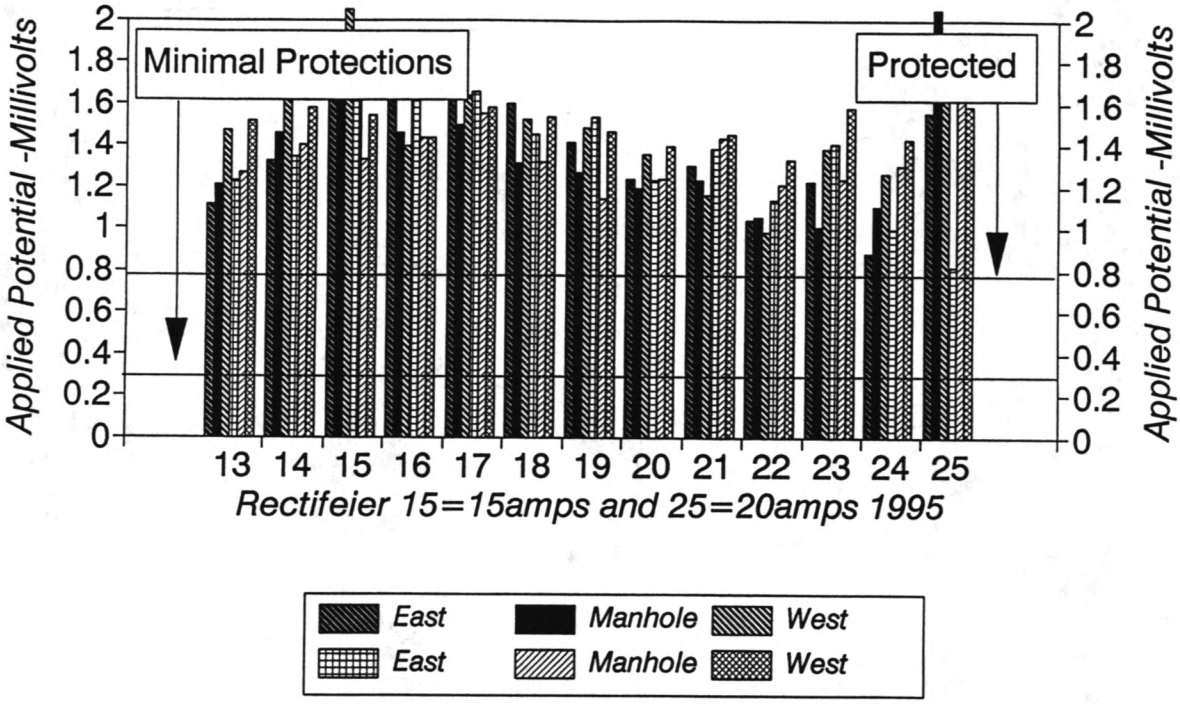

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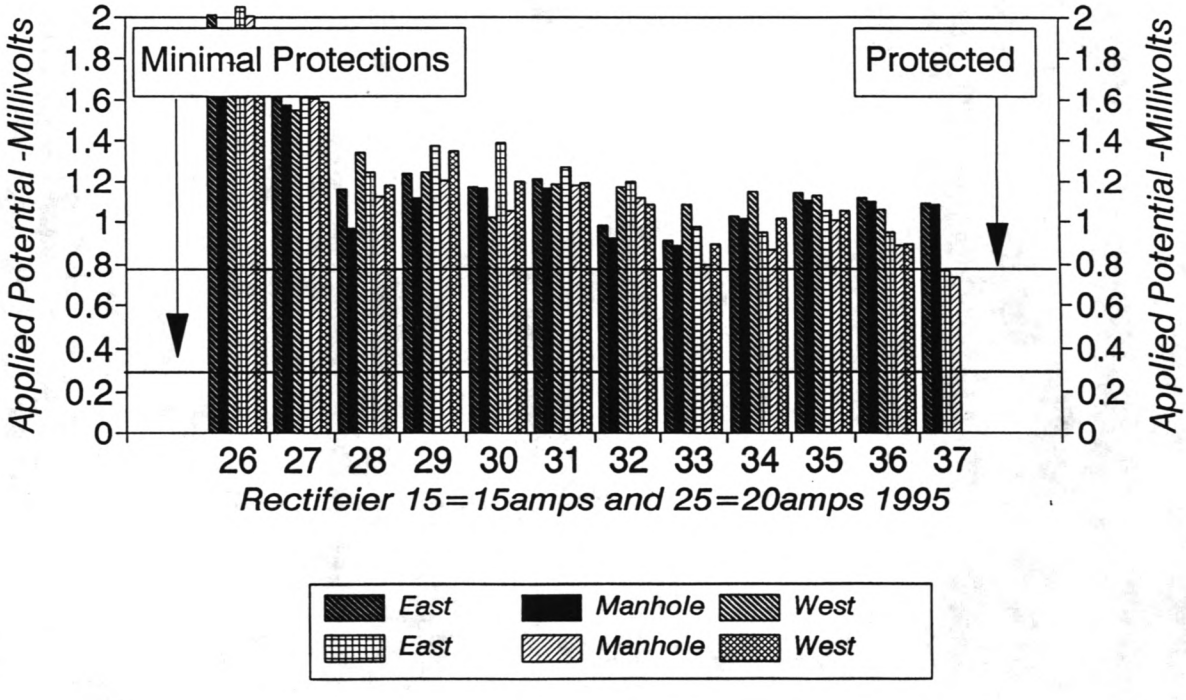

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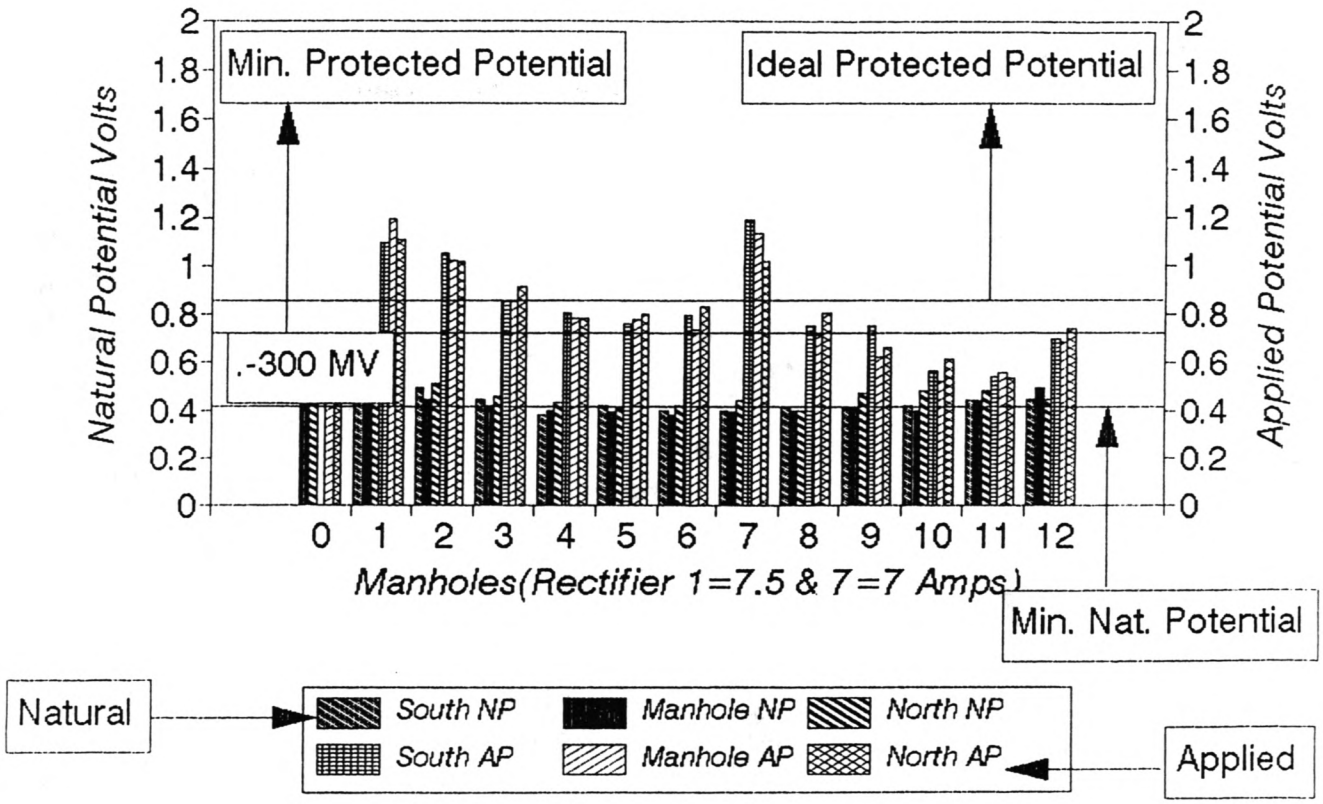

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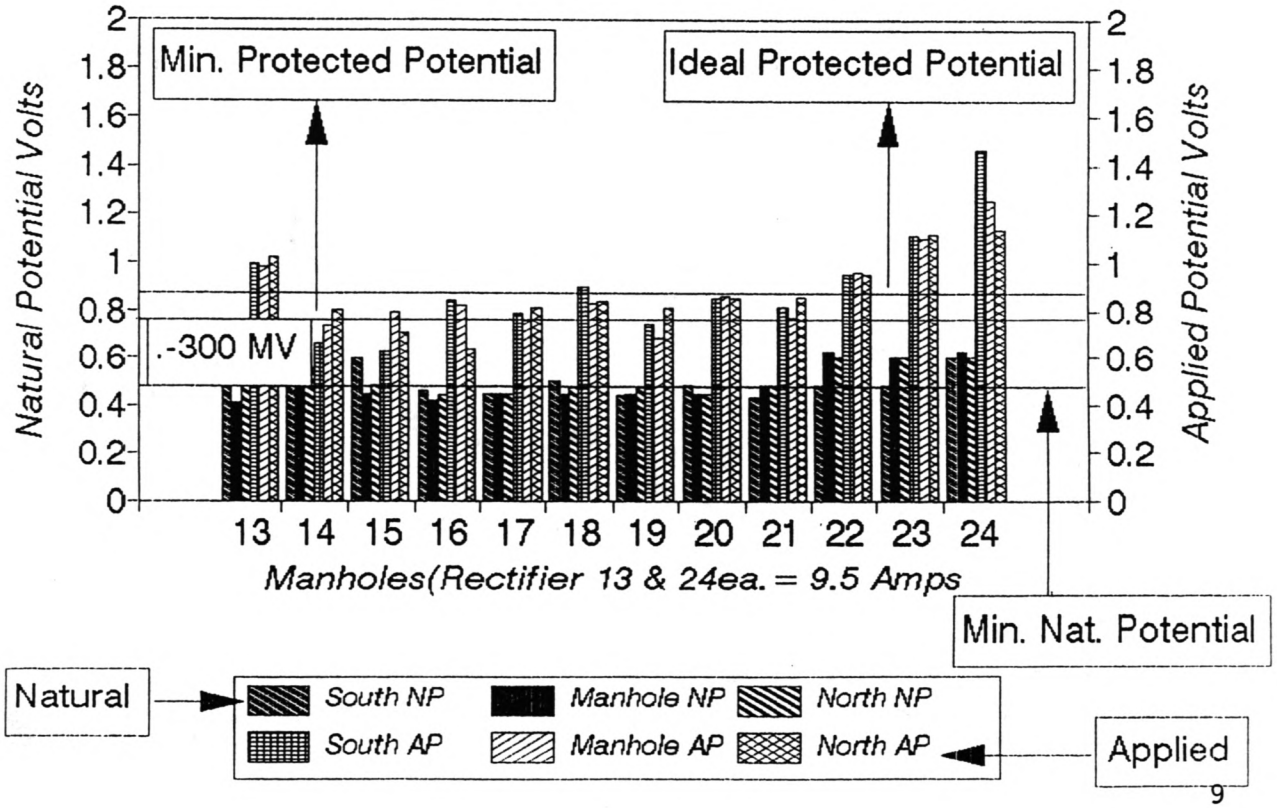

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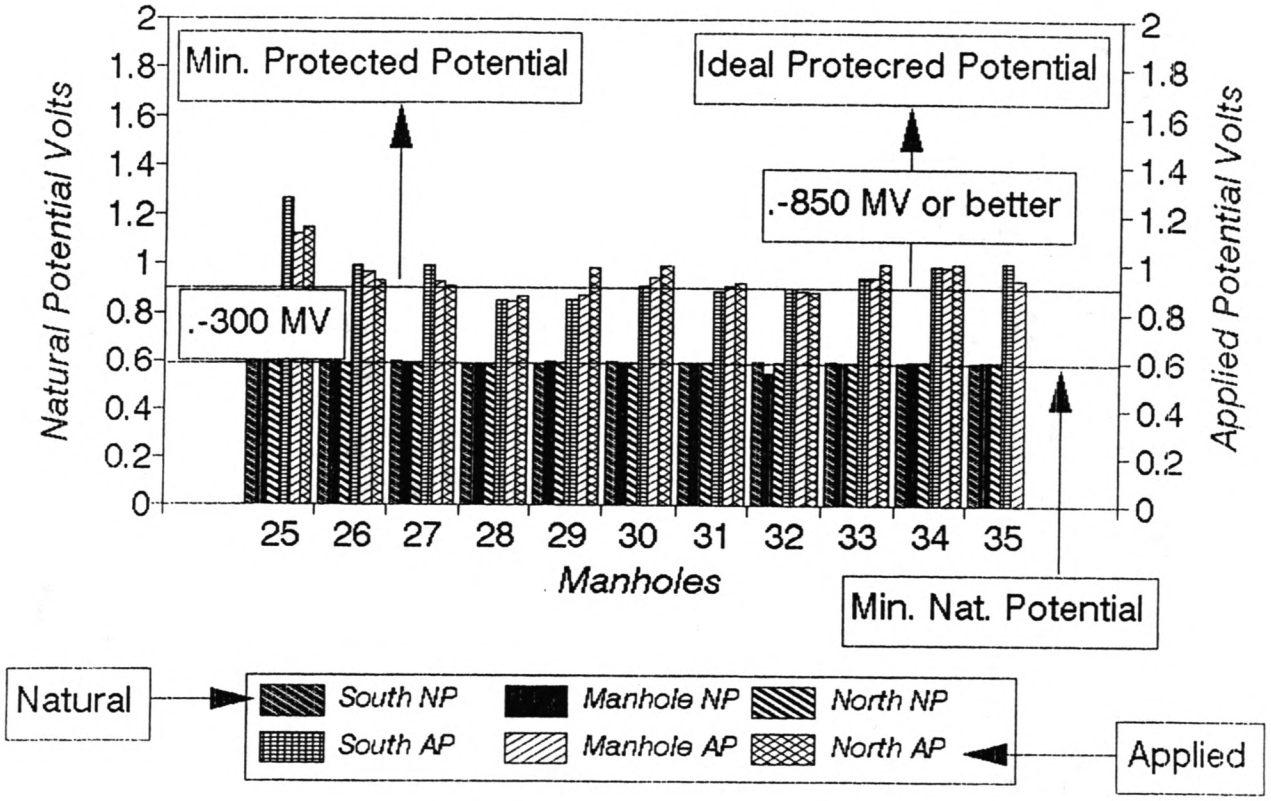

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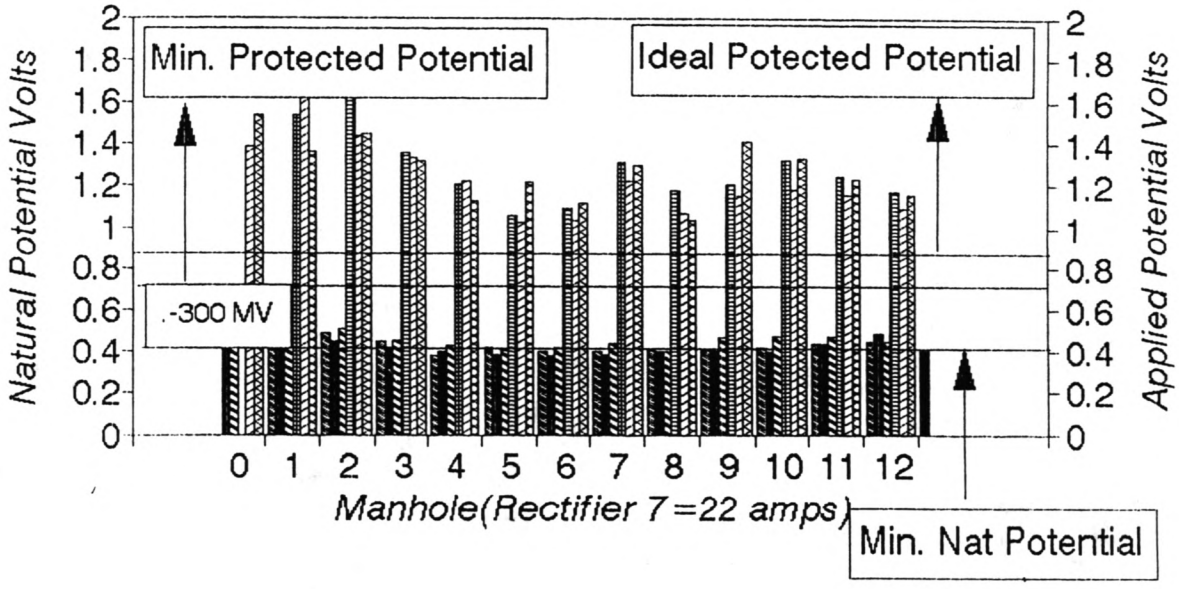

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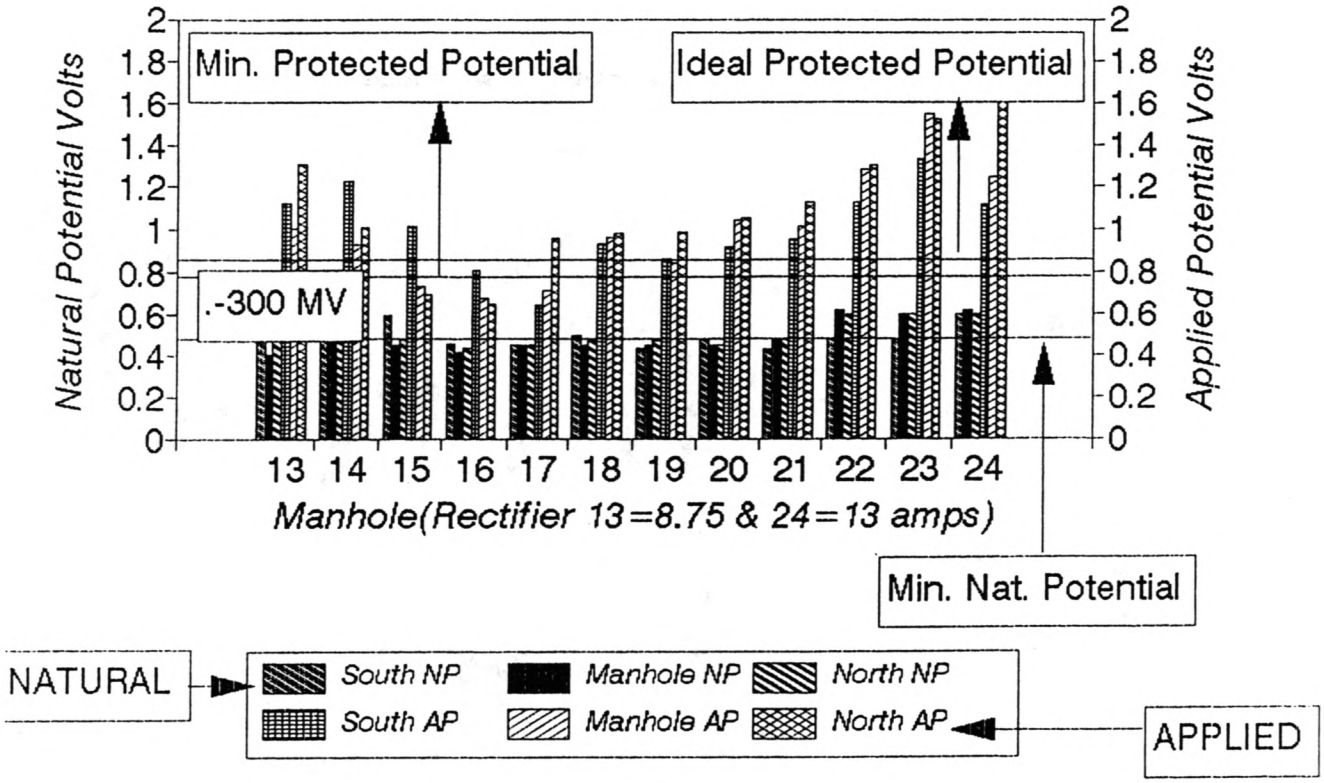

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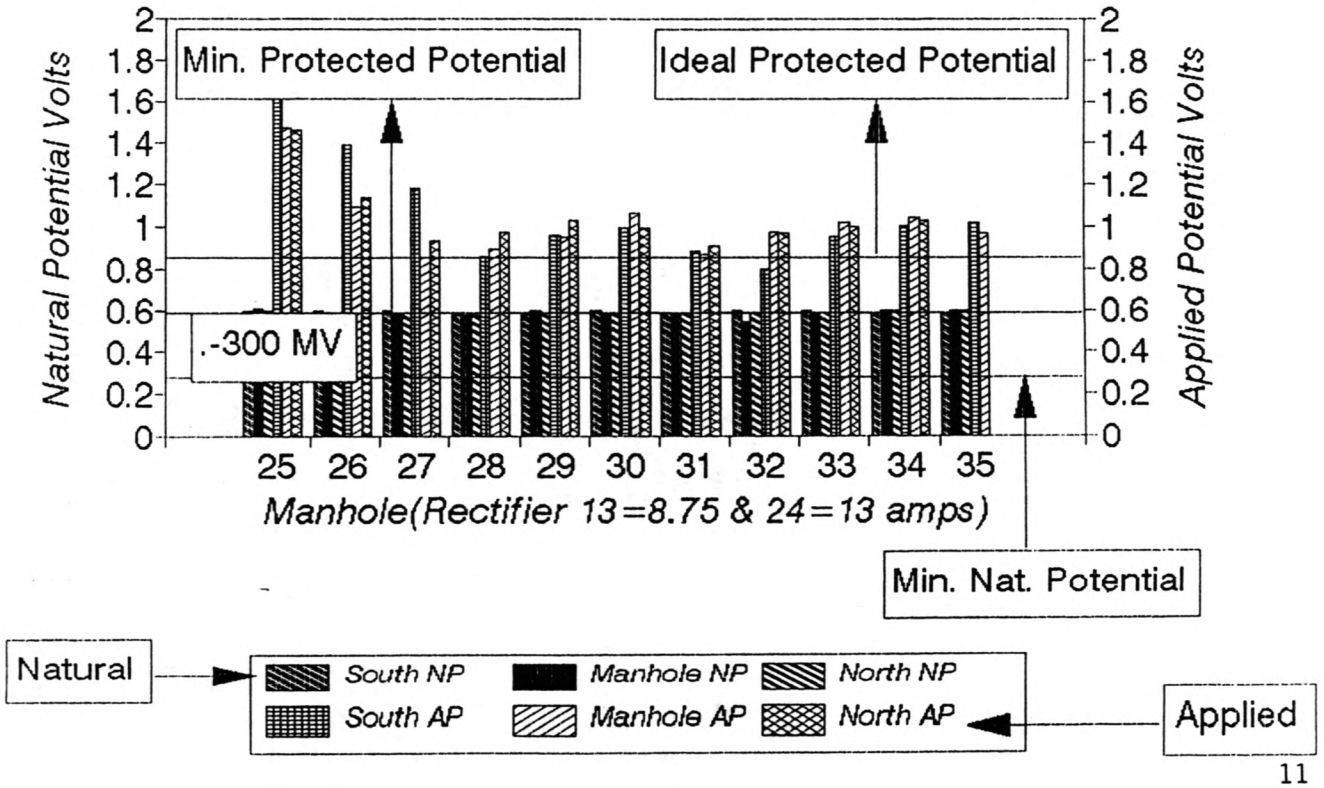

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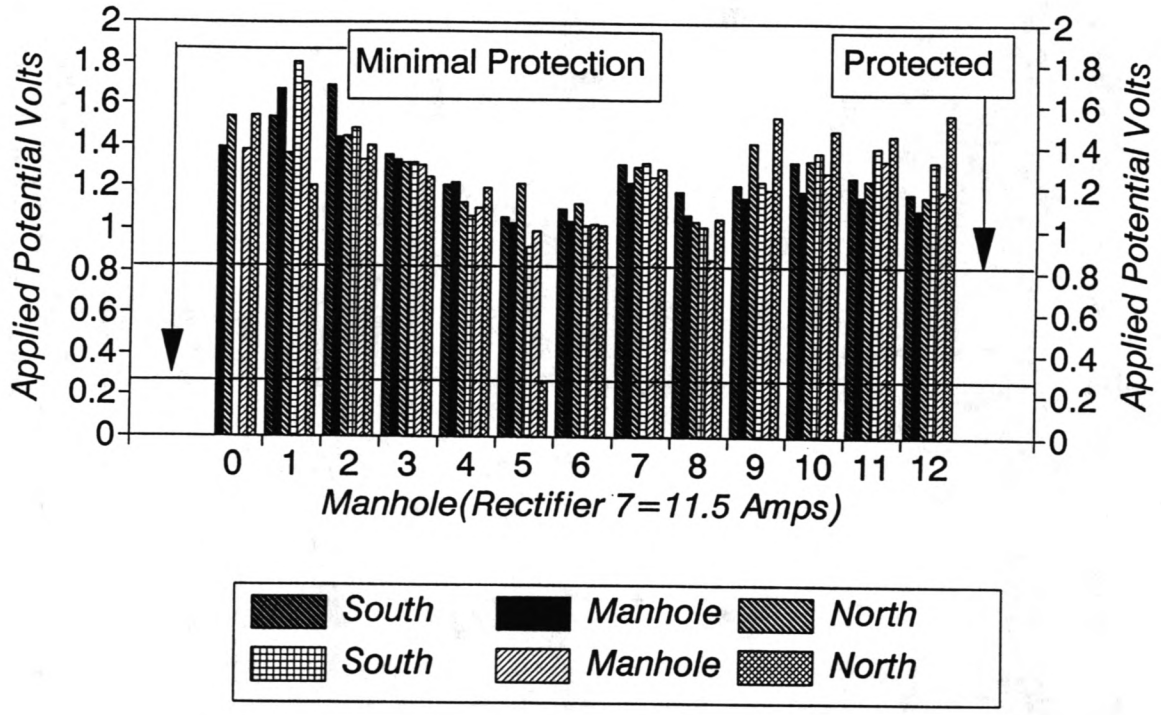

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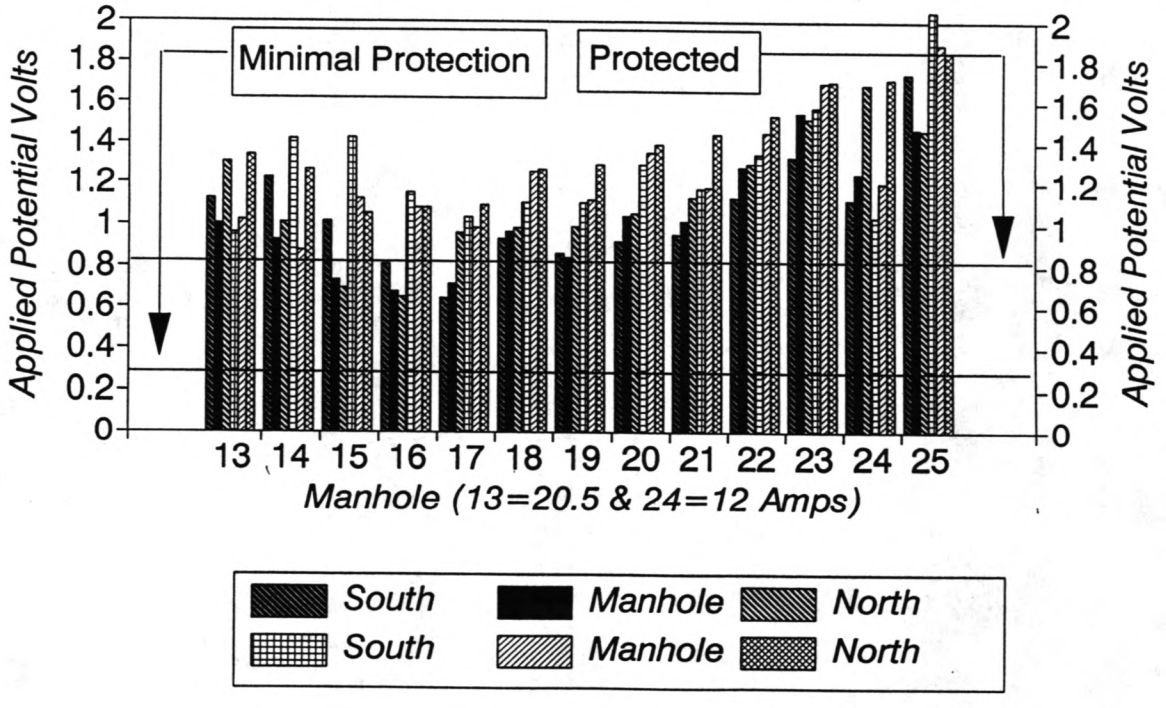

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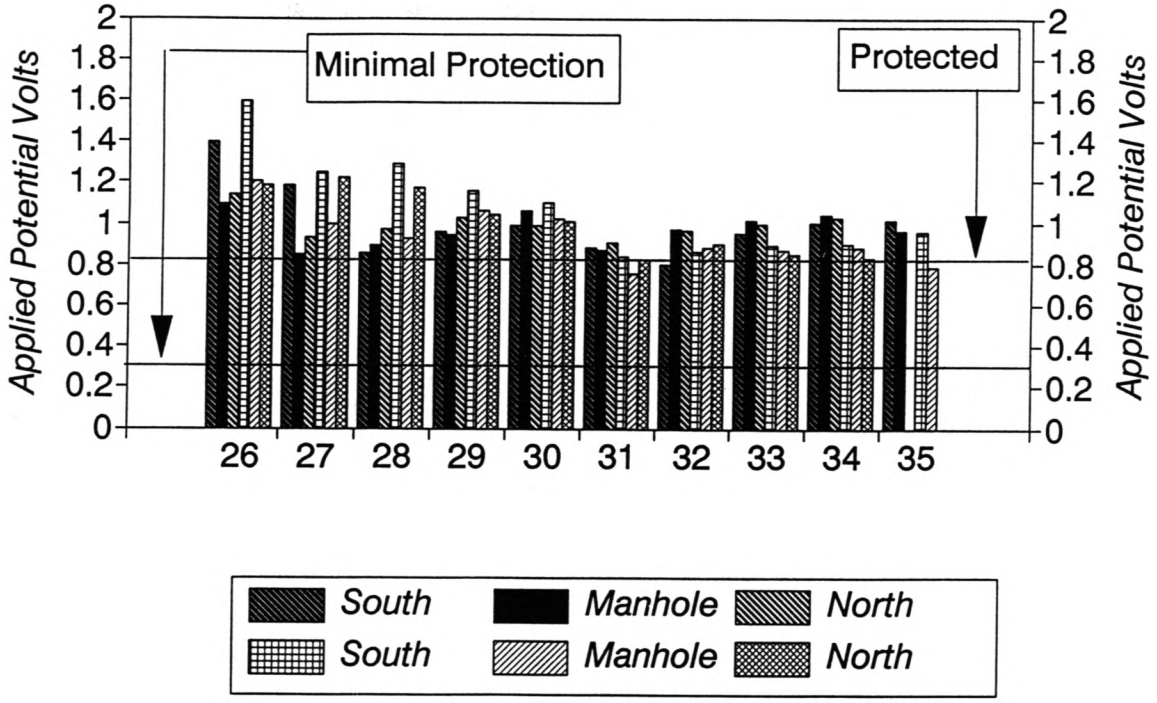

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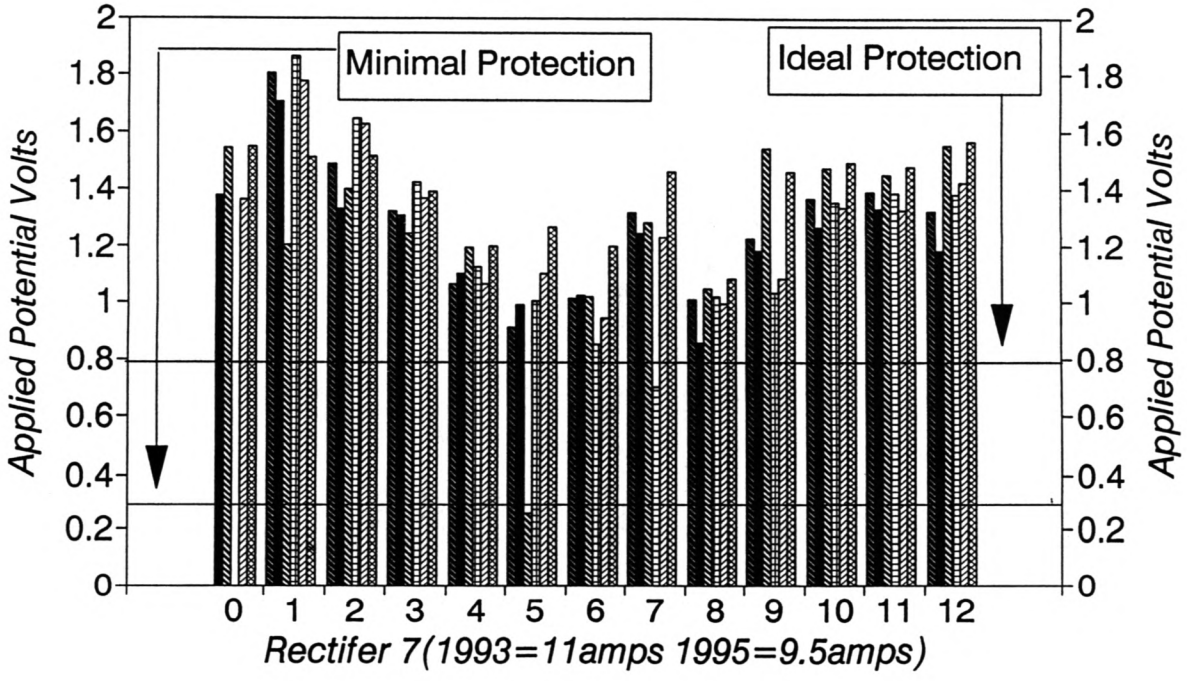

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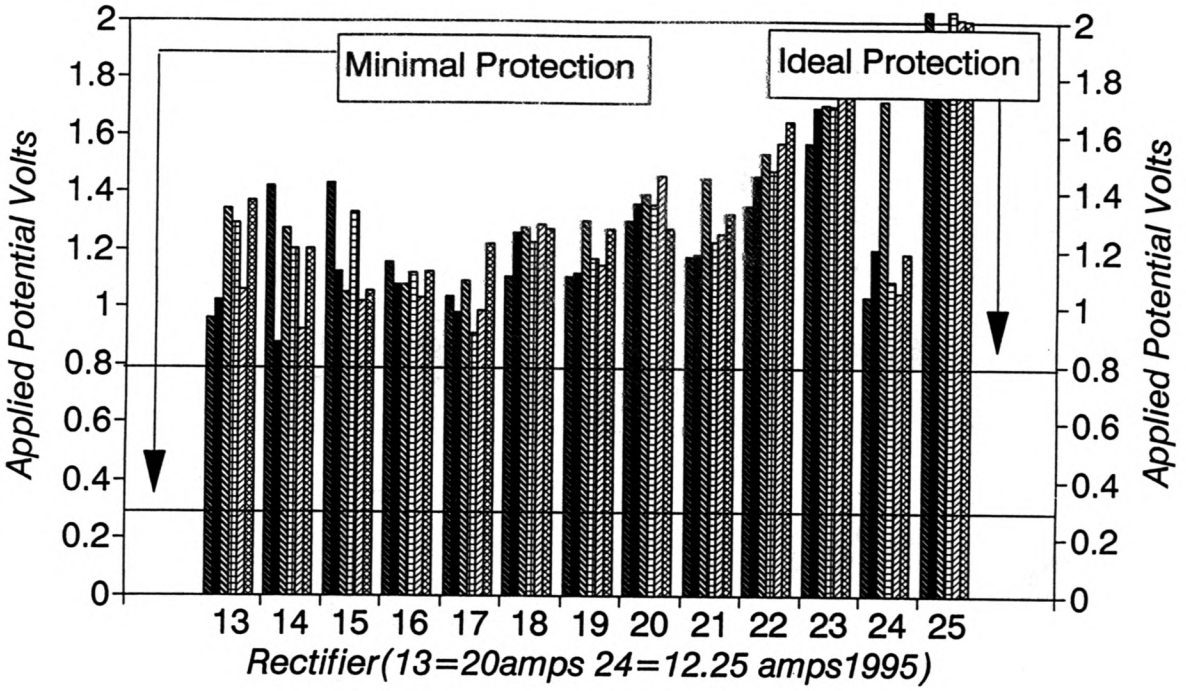

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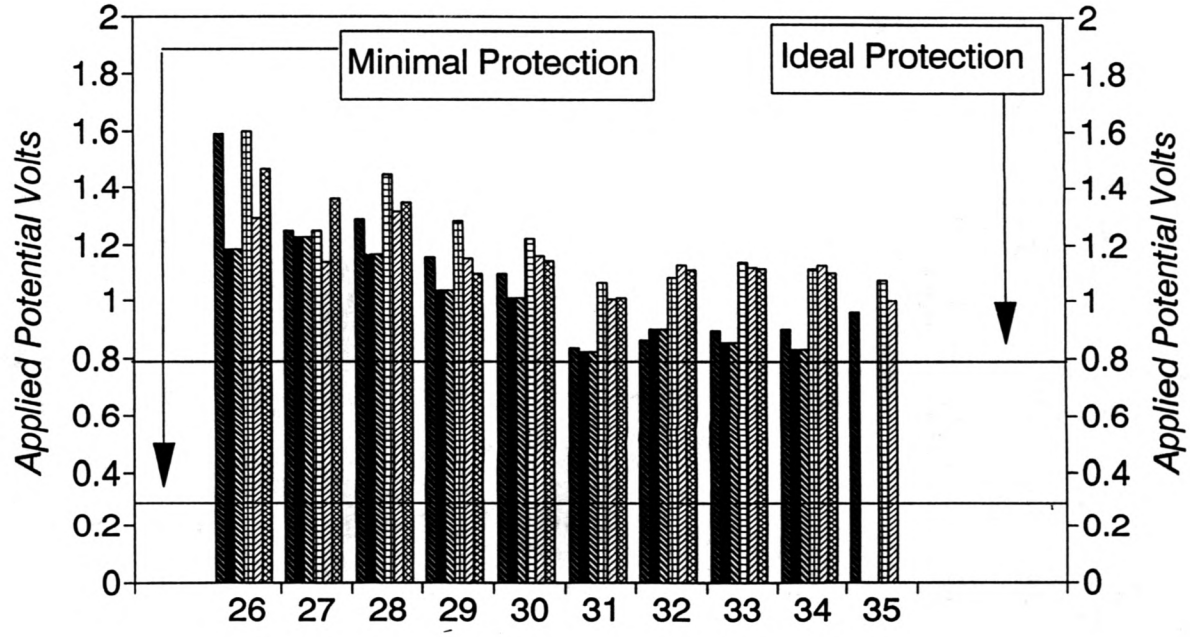

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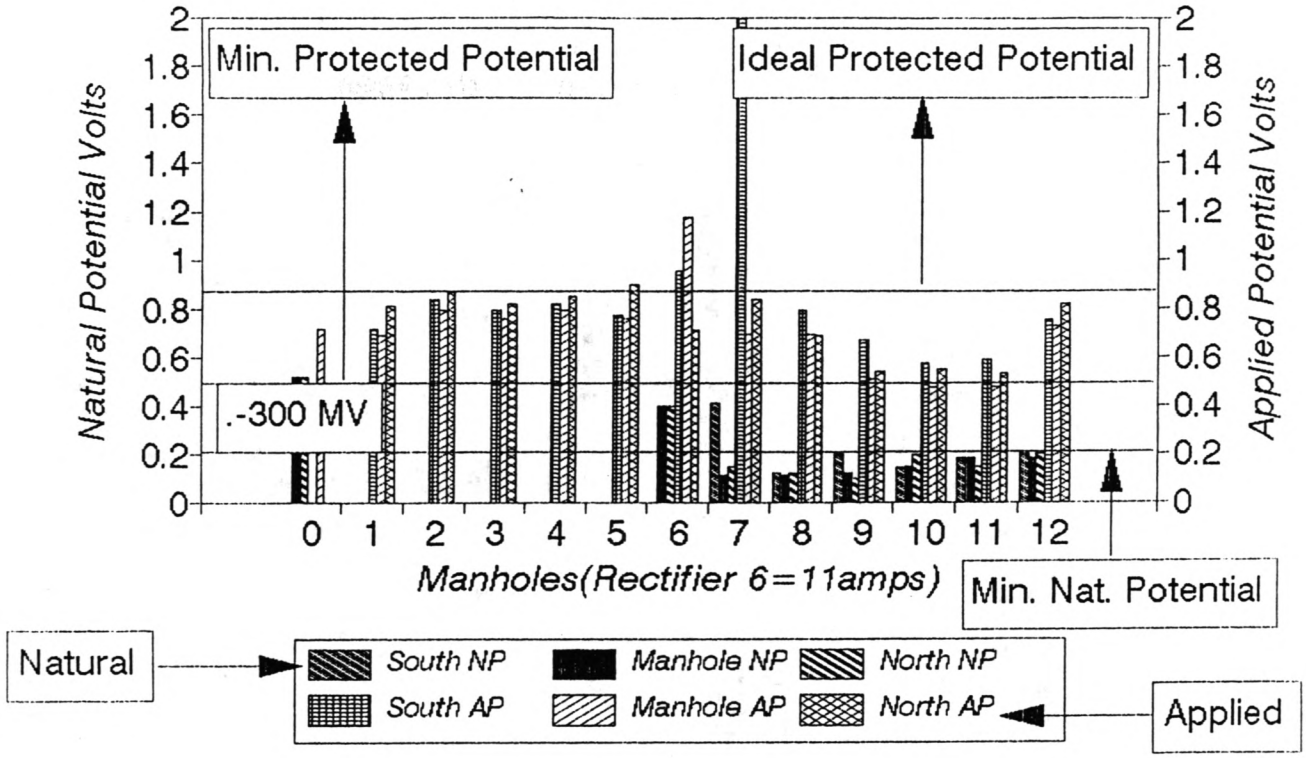

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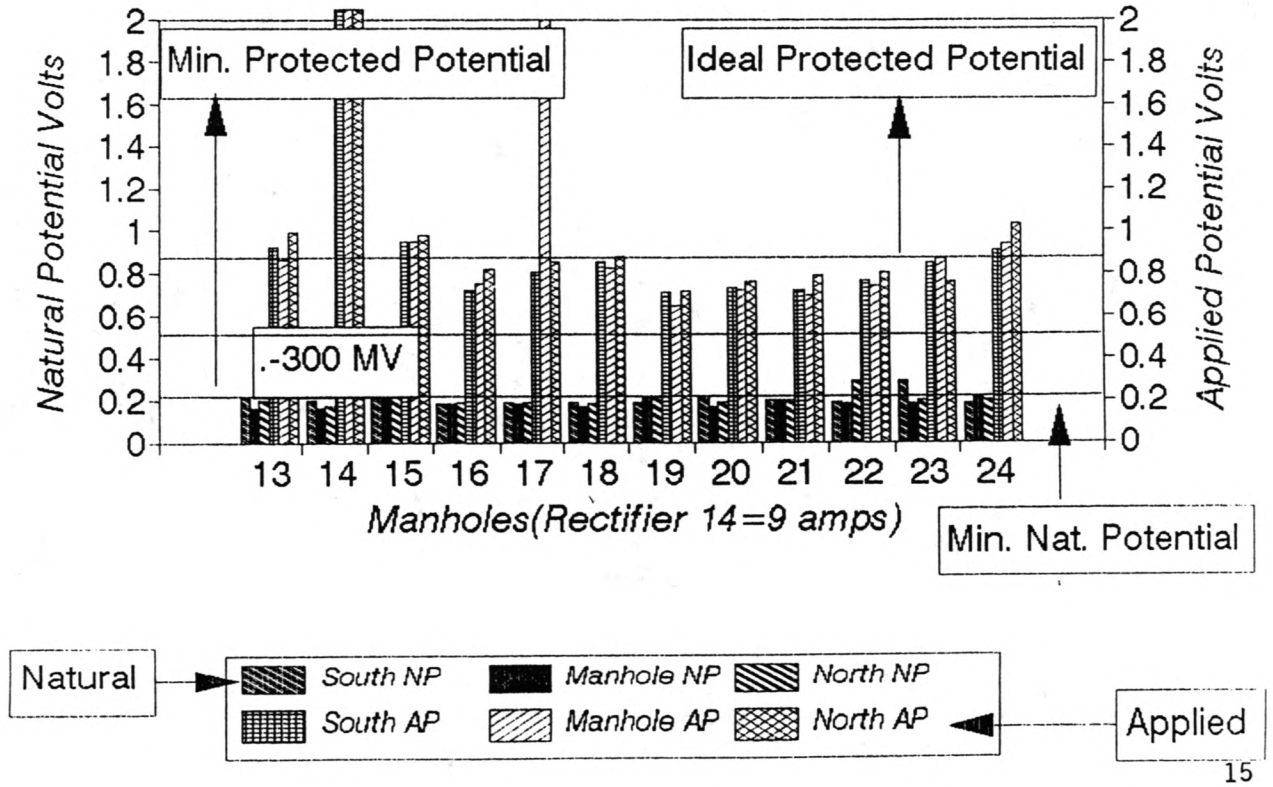

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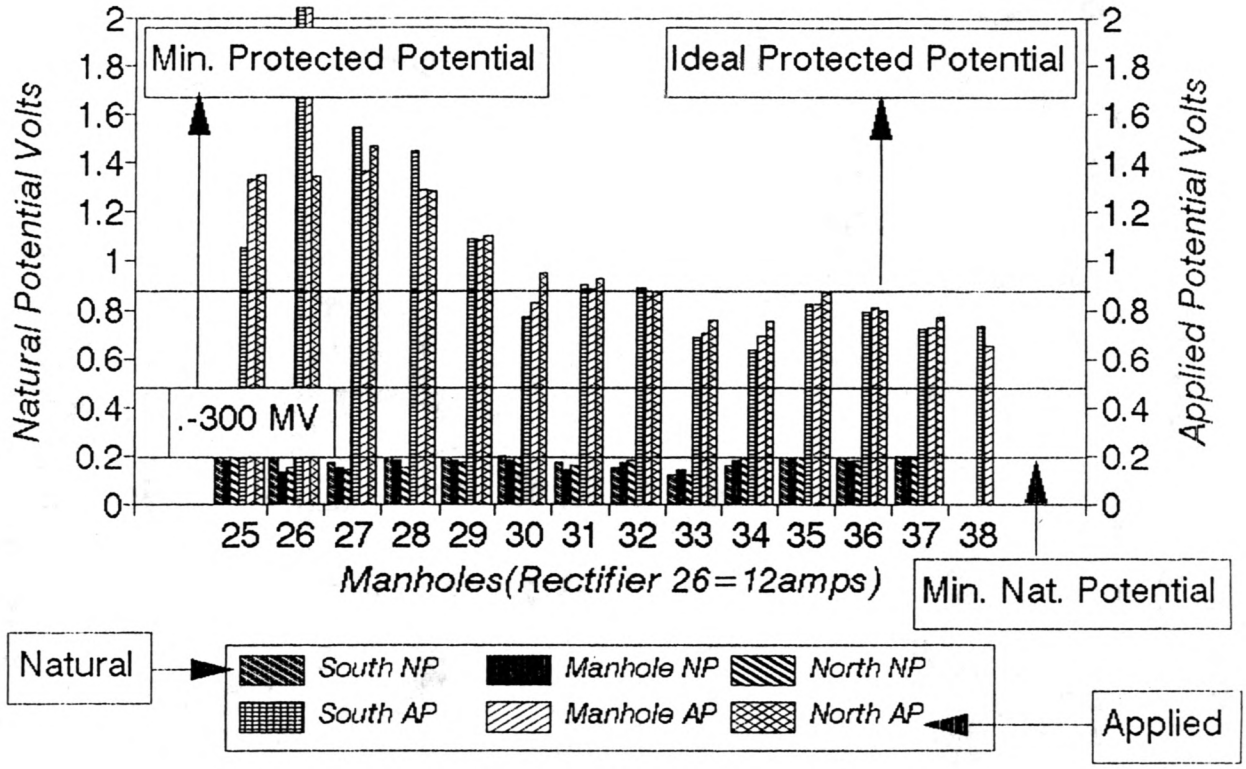

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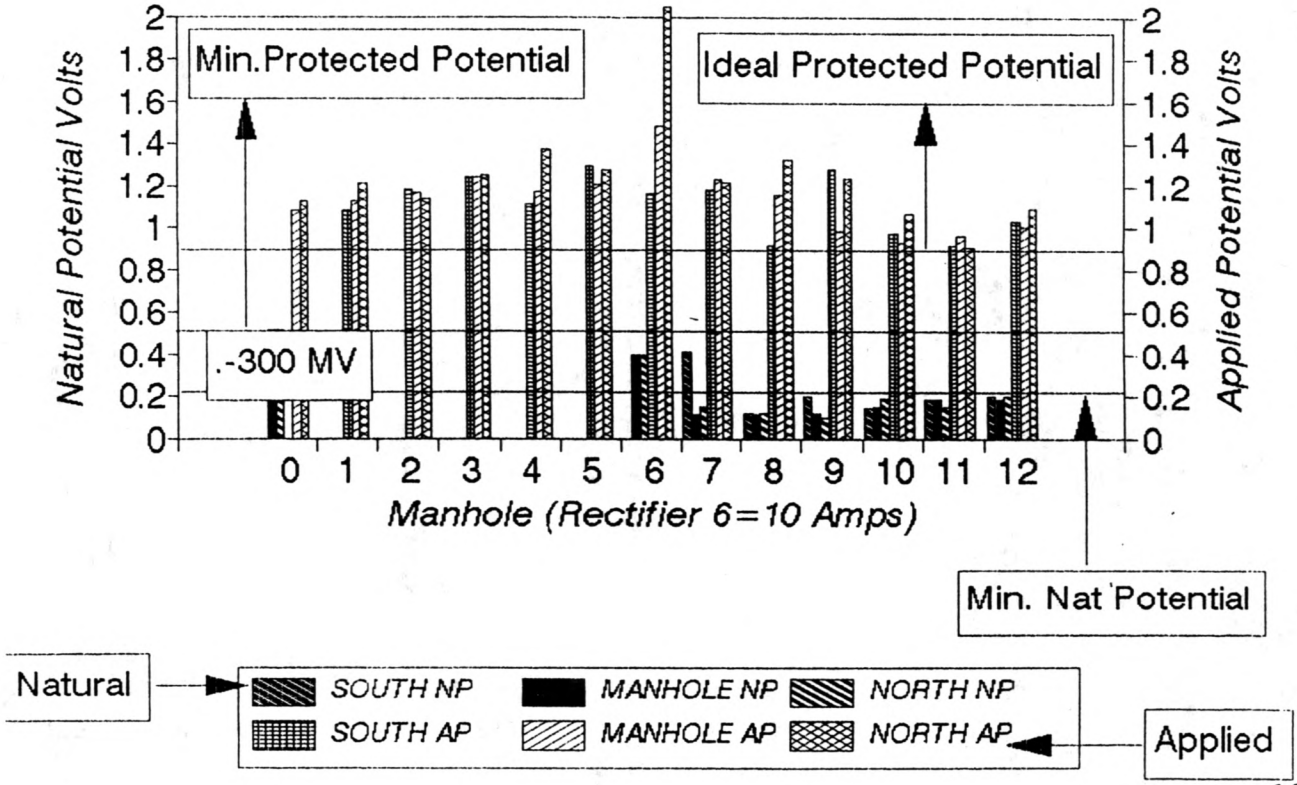

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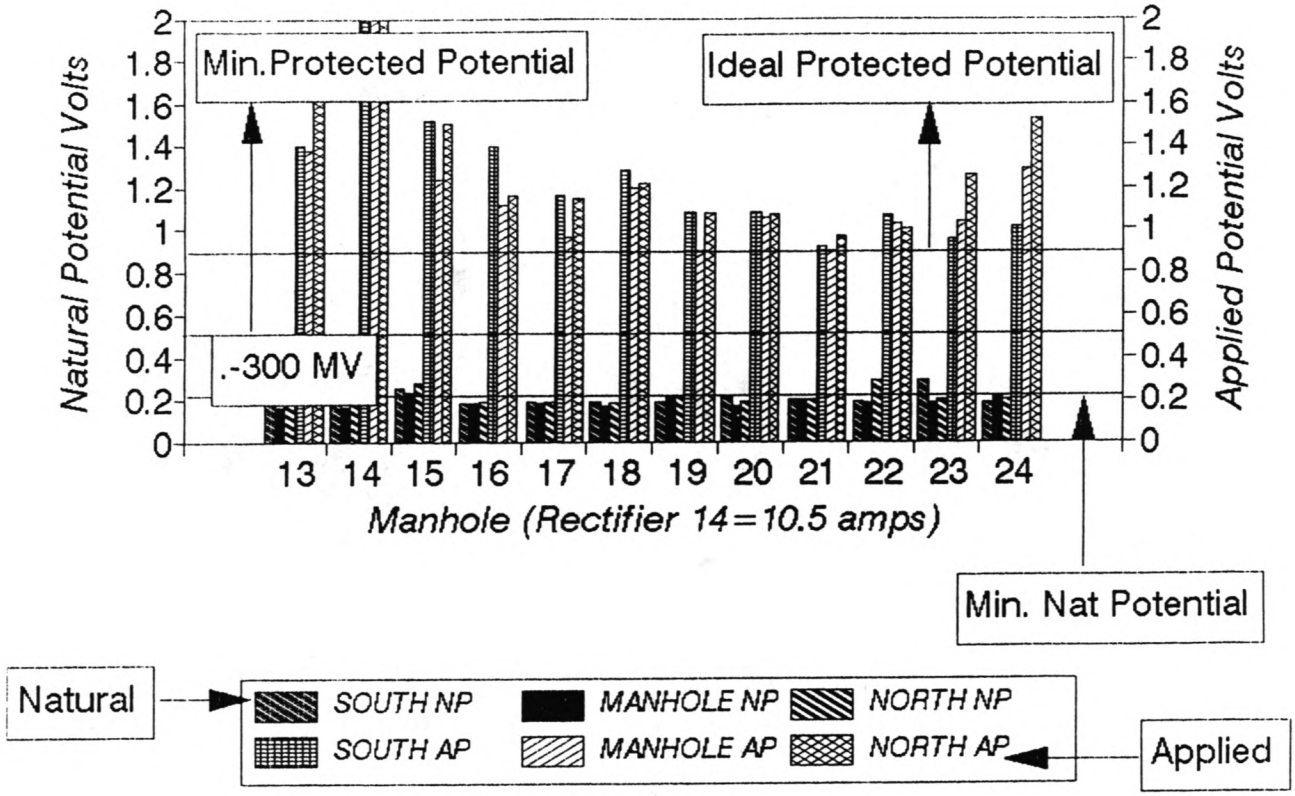

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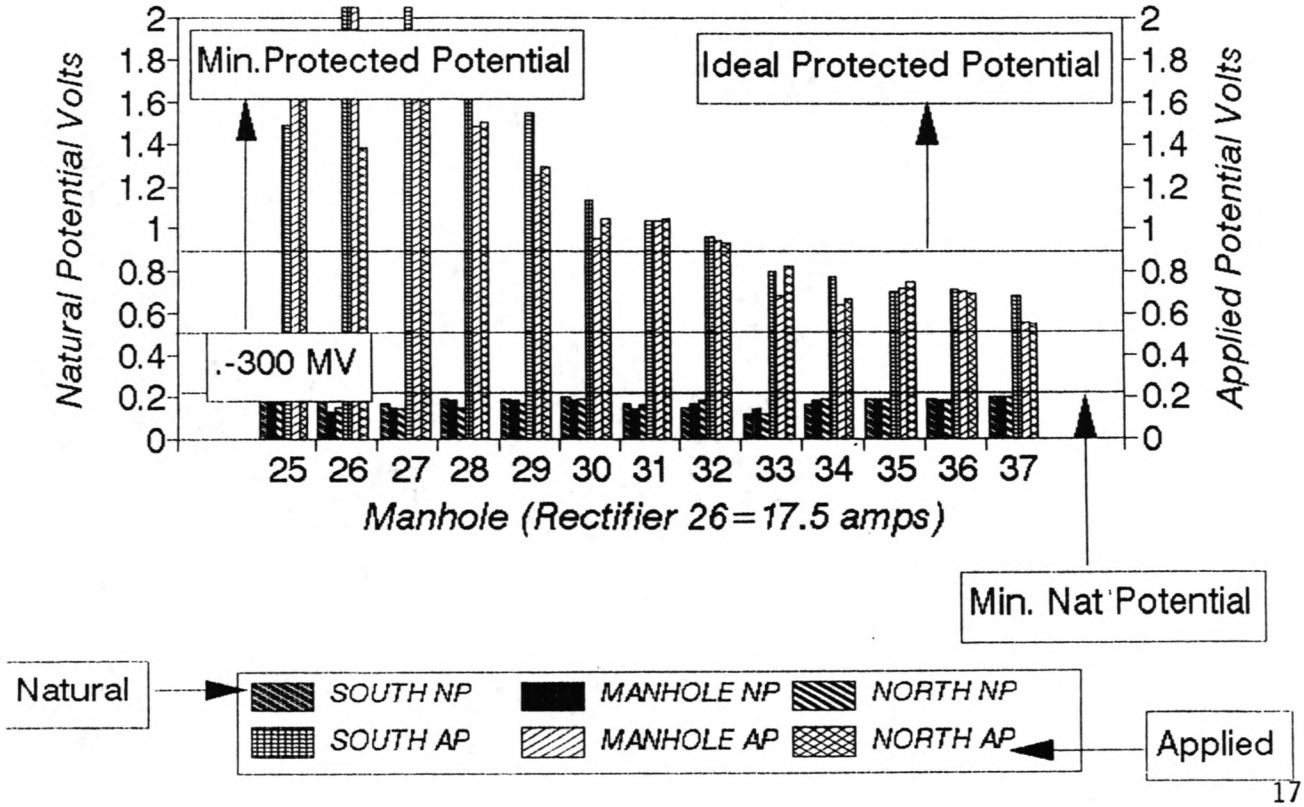

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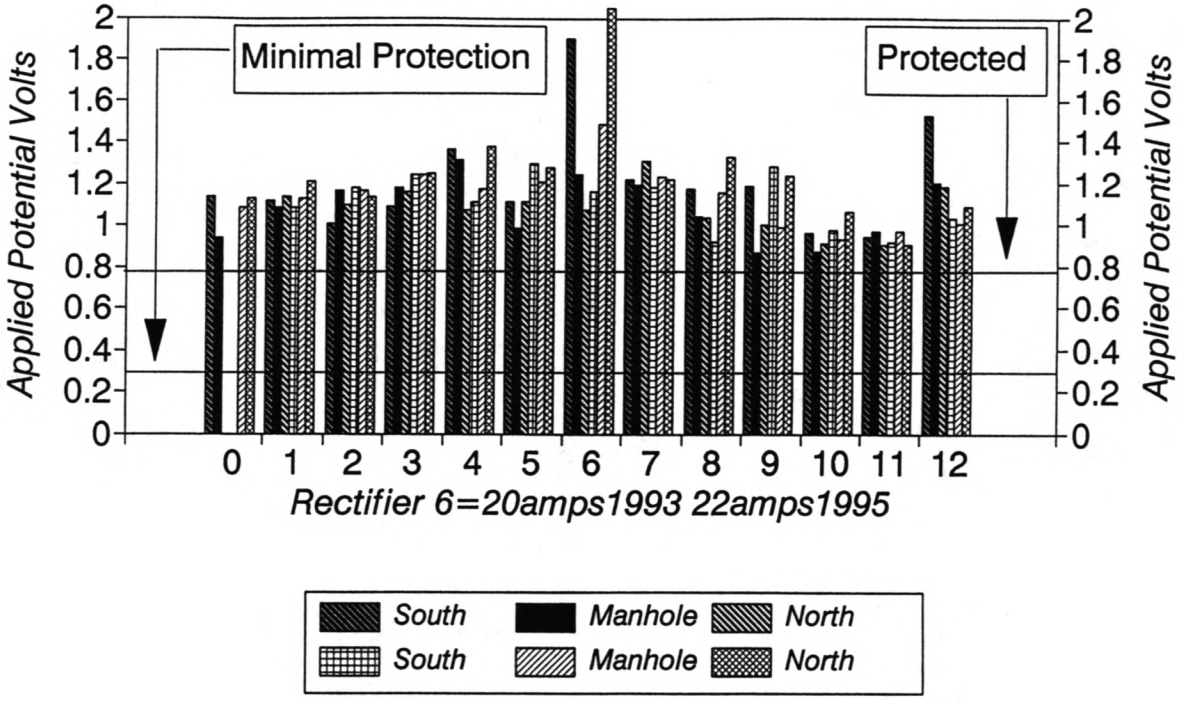

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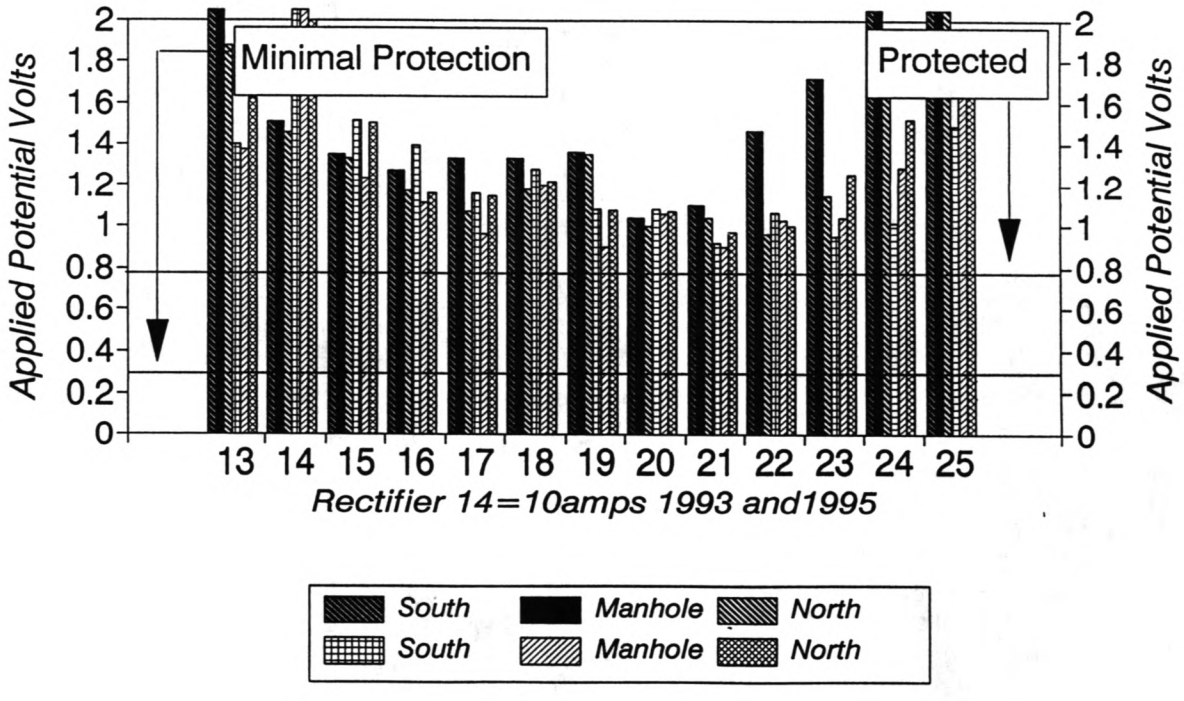

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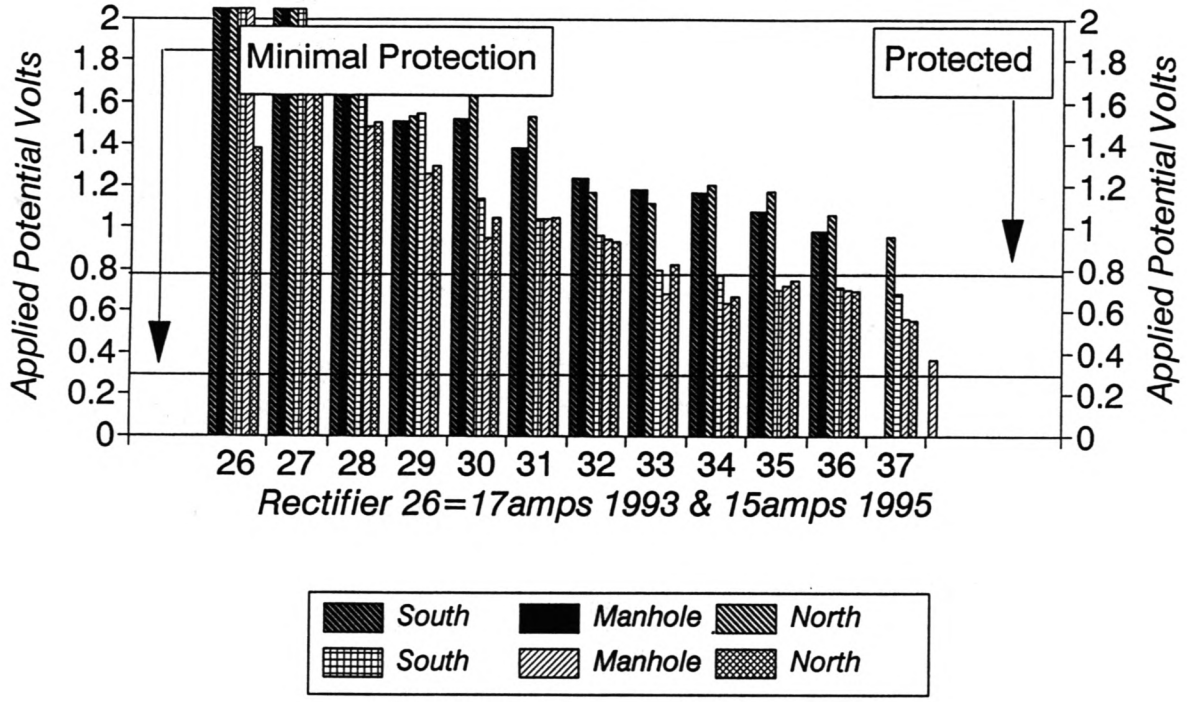

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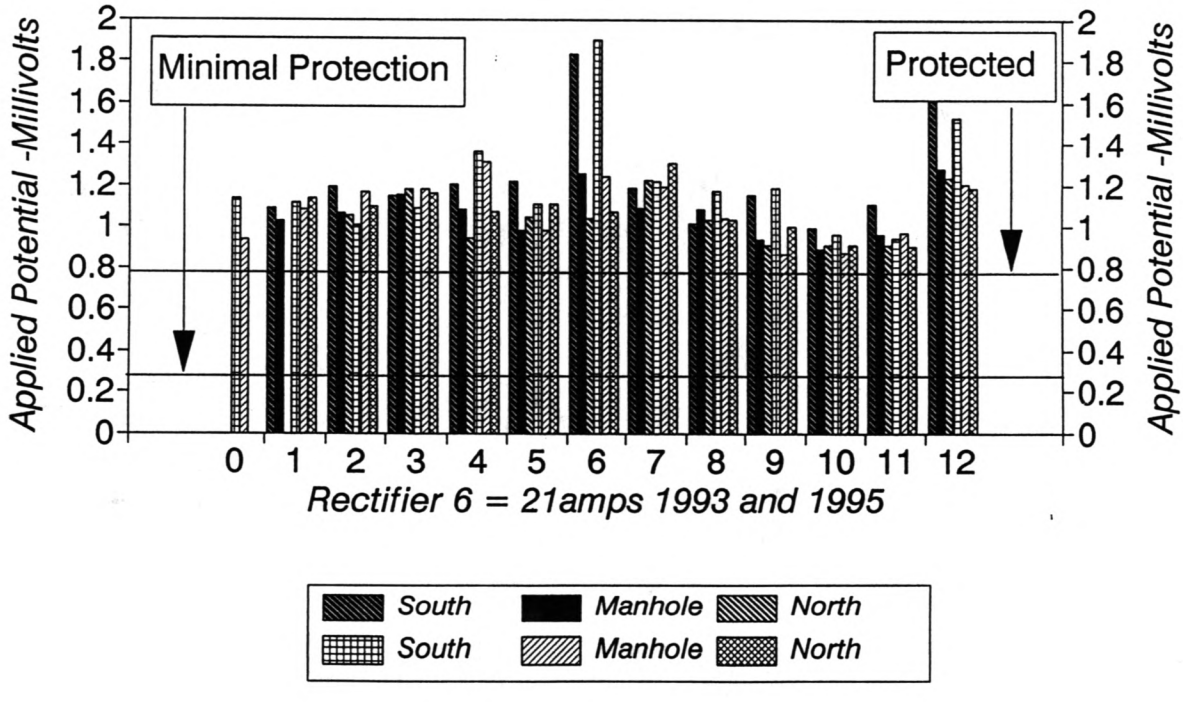

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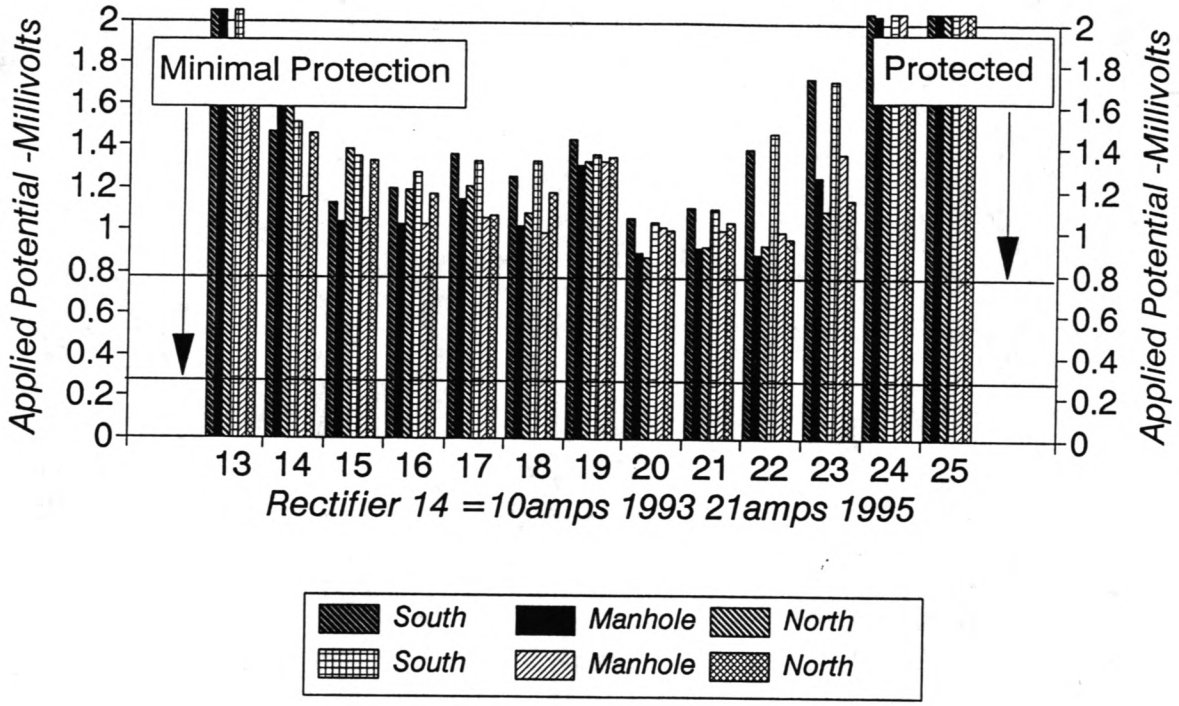

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