

# FIELD PERFORMANCE HISTORY



URD MEDIUM VOLTAGE CABLE  
INSTALLED BY CENTERPOINT  
ENERGY

# HISTORY - URD CABLE

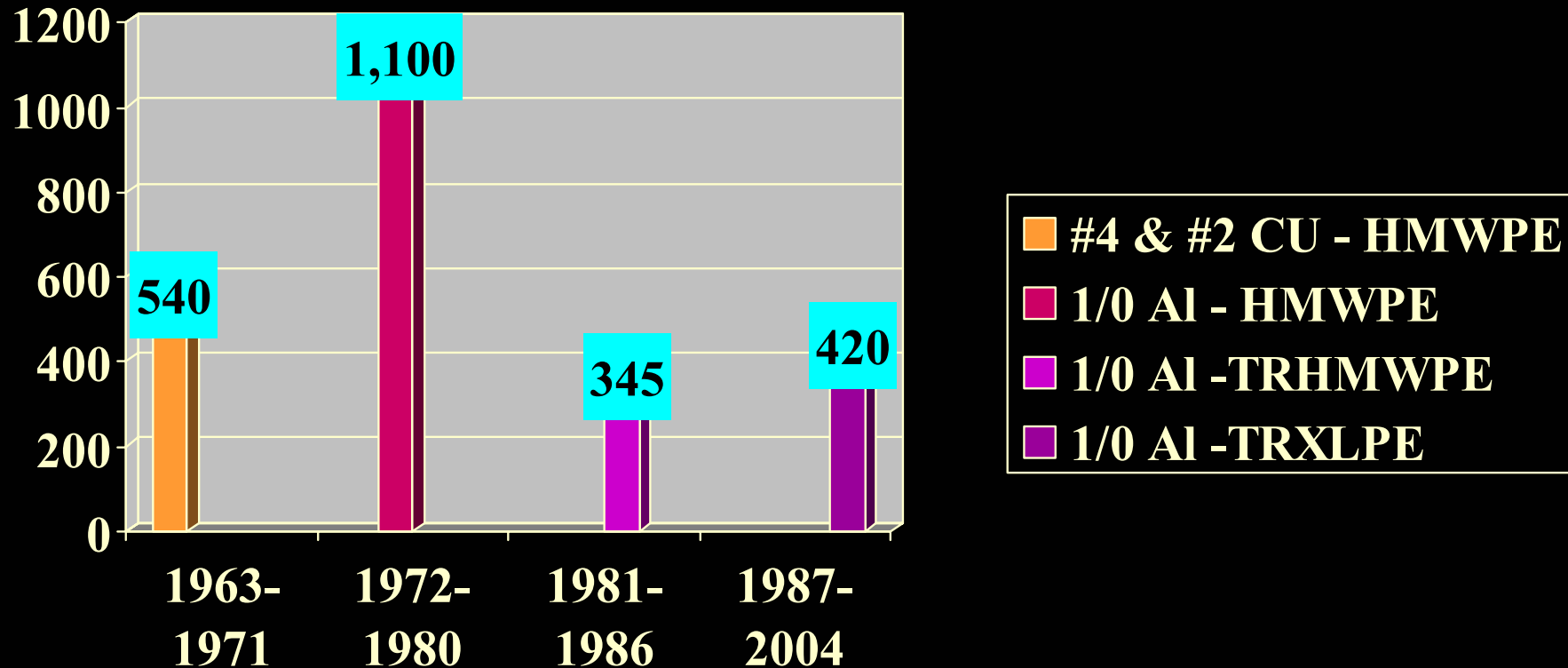
- CenterPoint Energy began installing 15kV URD cable in 1963
  - **1963-71** #4 & #2 copper, HMWPE, standard shields, full concentric neutral, unjacketed
  - **1972-80** utilized 1/0 aluminum conductor
  - **1981-86** 1/0 Al, TRHMWPE, standard shields, full neutral and PVC jacket with Mylar separator tape over the neutral
  - **1987-present** 1/0 Al strandfilled, TRXLPE, with neutral embedded in a LLDPE jacket

# HISTORY - URD CABLE

- The first 35kV URD cable was installed in 1974
  - **1974-80** 1/0 aluminum conductor, HMWPE, standard shields, full neutral
  - **1981-86** 1/0 Al, TRHMWPE, standard shields, full neutral and PVC jacket with Mylar separator tape over the neutral
  - **1987-present** 1/0 Al strandfilled, TRXLPE, super-smooth shields, with neutral embedded in a LLDPE jacket

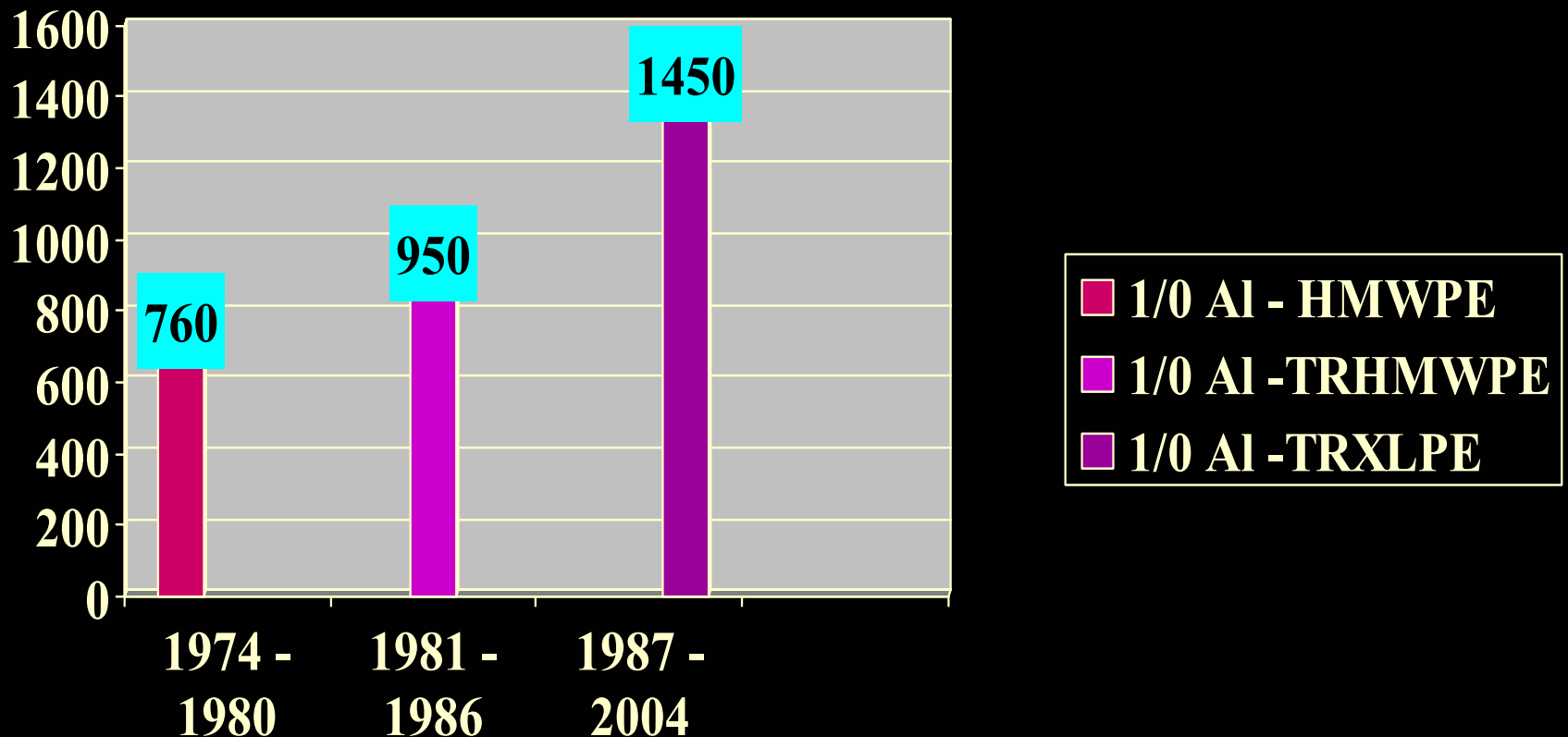
# CABLE TYPES INSTALLED AT 15KV

2,405 Miles of 15kV URD Cable Installed



# CABLE TYPES INSTALLED AT 35KV

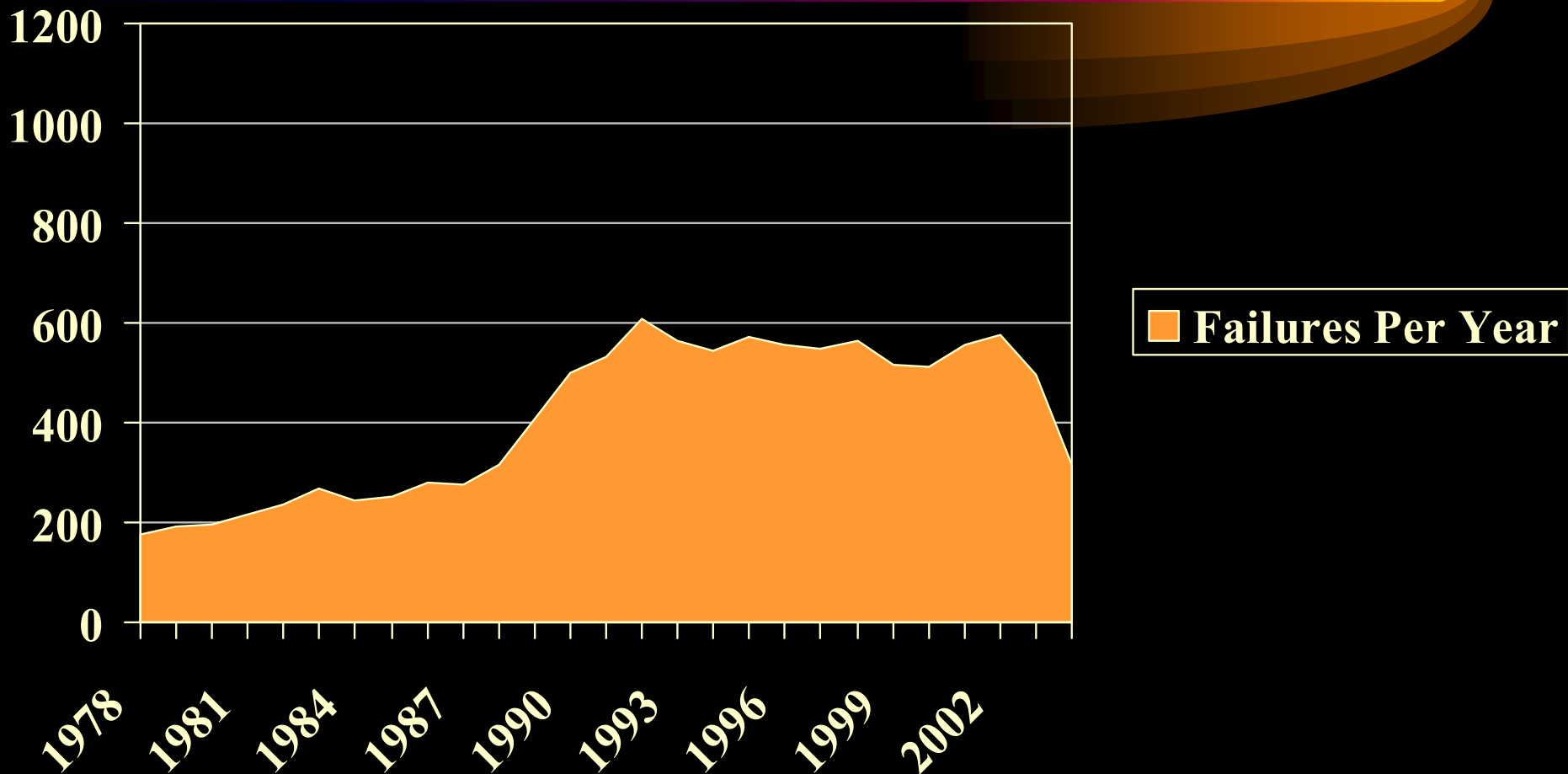
**3,158 Miles of 35kV URD Cable Installed**



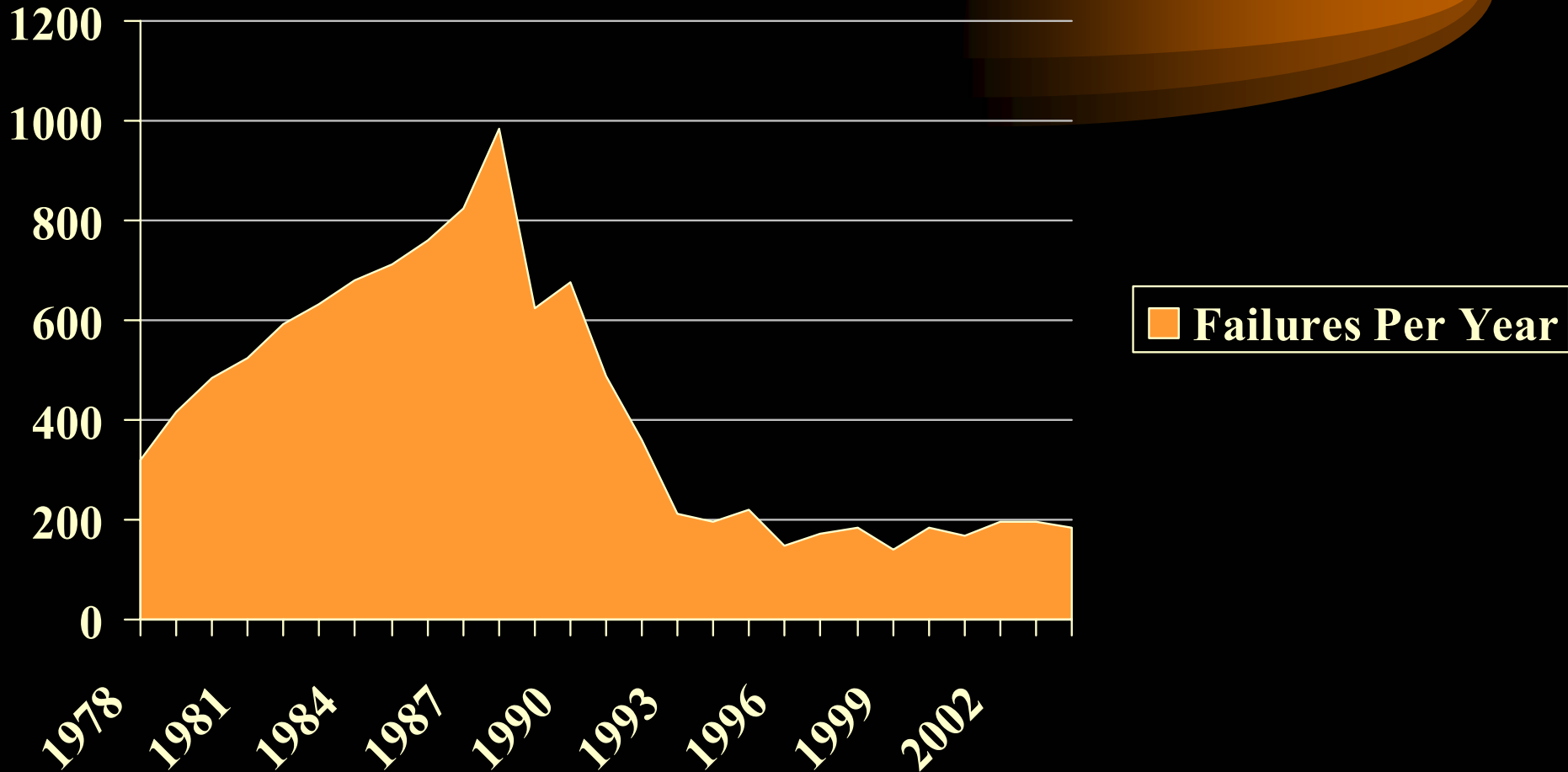
# FAILURE RATE BACKGROUND

- 98% of the dielectric failures that occur annually are on cable installed prior to 1981.
- The remaining 2% of the dielectric failures are on cable installed from 1982 through 1986.
- There are no documented dielectric failures on cable installed after 1987.

# TOTAL 15KV URD CABLE FAILURES OCCURRING ANNUALLY



# TOTAL 35KV URD CABLE FALURES OCCURRING ANNUALLY





# CORRECTIVE ACTIONS IMPLEMENTED

- The first action taken was to start installing all of our URD primary cable in conduit
- Determine the best cable construction for use on CNP's URD system.
- Initiate a 5 year cable replacement program at 35kV.

# FAILURE RATE

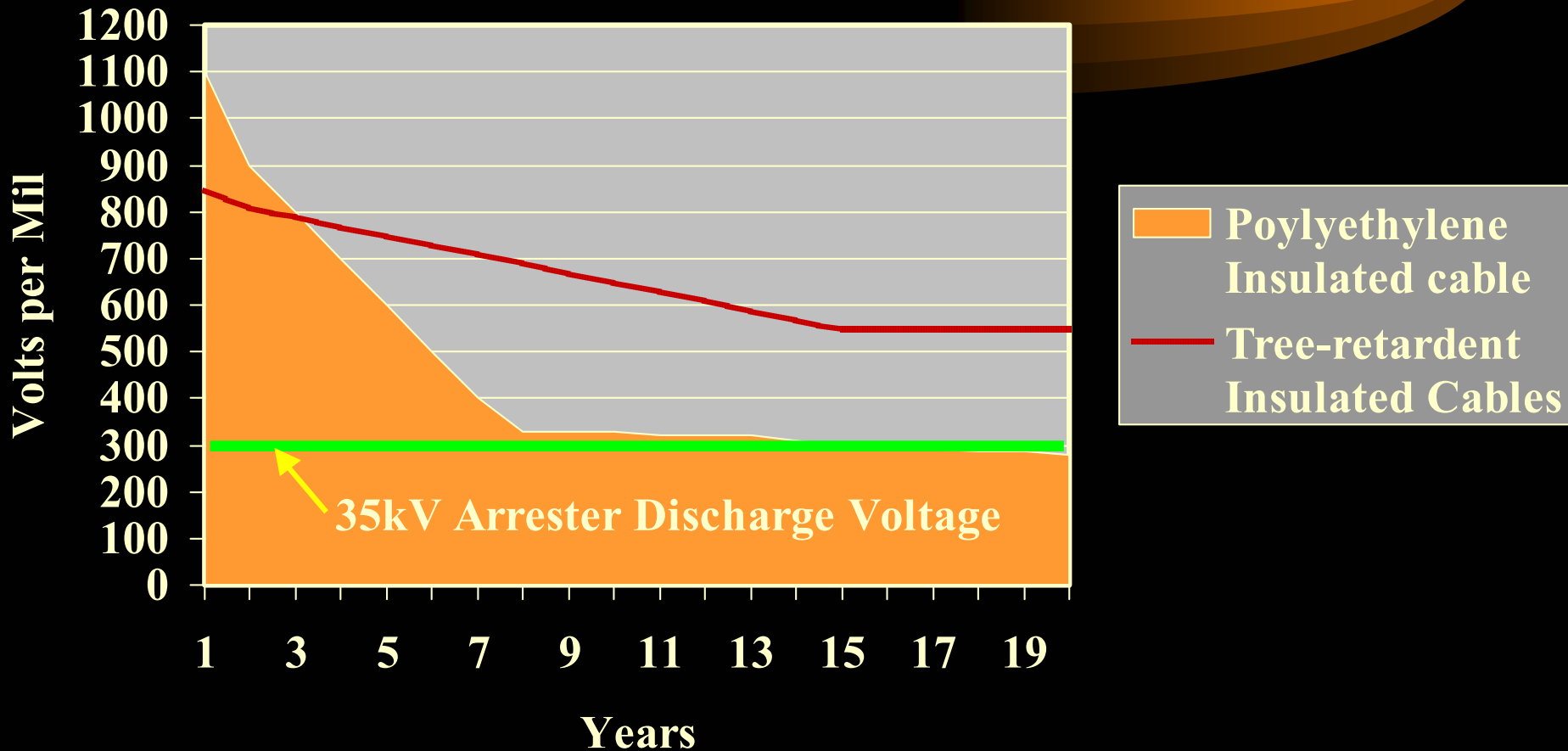
- 15KV Cables installed prior to 1980, that wereunjacketed and direct buried, have an average annual failure rate of approximately 0.6 failures per mile.
- 35kV Cables installed prior to 1986, that wereunjacketed and direct buried, have an average annual failure rate of approximately 1 failure per mile

# FAILURE RATE - CONTINUED



- 15KV cable failure rate for total installed population is 0.57 failures per mile.
- 35KV cable failure rate for total installed population is 0.03 failures per mile.

# PRIMARY REASON FOR DIELECTRIC FAILURES



# CURRENT PRACTICES TO MAINTAIN RELIABILITY

- Ensure that the cable received by CNP meets industry requirements.
- Maintain an evaluation process for cable replacement as part of URD rehab program.

# SUMMARY



- The URD primary cable used by CNP provides a reliable service life at the lowest cost.
- Maintaining an active review process for cable replacement minimizes annual O&M costs.