

Decision No. 52658**ORIGINAL**

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the Application of)
 PACIFIC GAS AND ELECTRIC COMPANY for)
 an order of the Public Utilities)
 Commission of the State of California)
 amending and modifying certain pro-)
 visions of General Order No. 95.)

Application No. 25309
 Fifth Supplemental

F. T. Searls and John C. Morrissey, for applicant.
Meron A. Walters, for Local Union 1245 of IBEW;
J. J. Deuel and Joseph Q. Joynt, for California
 Farm Bureau Federation; Bruce Wenrick and
Rollin E. Woodbury, for Southern California
 Edison Company; interested parties.
Robert W. Hollis, for the Commission staff.

FIFTH SUPPLEMENTAL OPINION

Pacific Gas and Electric Company, by its fifth supplemental application filed July 7, 1955, in the above-entitled proceeding seeks an order of this Commission authorizing it to deviate from certain of the rules of General Order No. 95, "Rules for Overhead Line Construction" so as to permit the grounding of the enclosing metal cases of pole-supported capacitors, switches, service restorers, regulators and electrical control equipment when such cases are installed at clearances from conductors less than as specified in the general order for grounded cases.

Public hearing in the matter was held before Examiner F. Everett Emerson on November 1, 1955 at San Francisco.

During the period October-December 1953, applicant installed about 30 banks of switched capacitors on various of its 12-kv lines in its Humboldt Division. In compliance with the rules of the general order as related to clearances from conductors, the cases of such capacitors were nongrounded. Of the 30 switched

capacitor installations, 22 subsequently had operating difficulties or suffered equipment failures. Applicant and its equipment supplier investigated the failures and concluded that grounding the cases of 12-kv automatically switched capacitors was a positive prevention of equipment damage of the type being experienced. They further concluded that the grounding of such cases would eliminate the possibility of electrical shock being experienced by persons operating or adjusting the devices, located at the base of the pole, which control operation of the switches located at the top of the pole.

By letter dated January 10, 1955, applicant requested that the Commission authorize the grounding of 12-kv switched capacitors as a departure of a temporary nature and limited scope from Rule No. 58.4-C of the general order. By Resolution No. E-873, issued January 18, 1955, the Commission granted applicant's request for a temporary period ending December 31, 1955 and imposed certain restrictions upon existing and future installations. By Resolution No. E-908, issued December 5, 1955, the period of time was extended to March 31, 1956, it being the intent of the Commission that the final determination of the entire matter would be undertaken in this present proceeding.

Applicant seeks revision of three of the rules of General Order No. 95; namely, Rule 52.7-F1 related to the grounding of hardware in proximity to circuits of 0-7500 volts, Rule 54.4-G related to the clearance of unprotected conductors of grounded metal boxes and equipment, and Rule 58.4-C related to the grounding and bonding of the cases of capacitors and regulators. By its suggested rewording of these rules, applicant intends that it would be permitted to install grounded-case automatically switched shunt capacitors at lesser clearances from energized exposed conductors

than the clearances permitted by the various rules of the general order. The revised rules as proposed by applicant, however, are so worded as to permit many other types of classifications of equipment to be installed on poles at clearances substantially reduced below those now required.

Two basic problems and two principles are involved in this matter. The first problem is that of equipment failure. The second problem is that of protecting, from electrical shock, persons who operate the adjustments or controls at the cabinet containing the sensing devices. The first principle may be broadly stated as being a basic recognition that linemen, while working on poles, should be exposed only to an irreducible minimum of grounded surfaces in order that they may not be subjected to any greater hazards than those minimum hazards inherent in their occupation. The second principle is that persons working on the ground or from grounded surfaces should be subjected only to an irreducible minimum of exposure to energized conductors or devices. These two principles are reflected in many of the specific rules of the general order. Together with other principles involving clearances of conductors and strengths of construction, as related to the protection of the workmen and the public, they compose the entire philosophy of the rule-making directed to overhead line construction. The two principles are compatible and the rules implementing them are not in conflict when properly interpreted.

Applicant's proposed solution to both problems is to ground all of the equipment cases. There seems to be no question that by so doing presently experienced equipment failures will be lessened. But by so doing, however, the first principle is violated by greatly extending the grounded surfaces to which linemen are exposed. Evidence respecting the causes of equipment failures

indicates that the over-all failure results from failure of low voltage insulation. This occurs as the result of the electrical stress placed upon it by leakage currents associated with the bushings and the normal leakage current through the dielectric of the capacitors to the cases. In our opinion this is a design problem. Its solution would seem to be that of providing insulation for the low voltage conductors adequate to meet the electrical stresses to which they may be subjected.

With respect to the problem of protecting the person who adjusts or operates the equipment contained in the control box there seems to be no greater problem than that of supplying adequate insulation and isolation. Applicant desires to use nonlinemen to operate and adjust the sensing equipment. When so doing, such personnel should be on the ground and the equipment case or cabinet should be grounded. When installed on a pole or platform and operated by linemen, the case or cabinet should be nongrounded. The rules of the general order clearly provide for these two situations. This equipment becomes defective or hazardous as the result of the same insulation failure above discussed. Its solution also seems to be one of design and could be met by employing instrument or control transformers, of adequate insulation, as 1:1 isolating transformers in the control leads between the equipment at top of pole and that in the cabinet. The problem and such a solution is not uncommon and is successfully met in other industries.

As subsidiary elements in applicant's showing, respecting advantages which might be gained by the grounding requested to be authorized, are reduction of shock hazards to linemen and lessening of the number of pole-top fires. Applicant is not seeking grounding of the cases of capacitors which are manually connected to or disconnected from the line and which, by the very nature of such

manual operation, create unbalanced conditions with resulting energizing of the cases (by capacitive coupling) for the entire period of time required for a lineman to effect the complete connection or disconnection of all three of the switches of a bank of capacitors. Such time creates seconds and perhaps even minutes of exposure. On the other hand, the automatically operated switches perform the operation in a matter of a few milliseconds. We find little merit in the contentions of applicant respecting these elements when viewed in the light of the relative hazards involved.

Under the provisions of the general order, capacitor banks may be grounded provided the clearances from unprotected conductors specified in Rule 58.4-C are maintained. The wording of Rule 58.4-C is similar to that of Rule 58.3-C3, applicable to the grounding of cases of transformers connected to 750-14,000 volt line conductors. There is an important difference, however. Rule 58.3-C3 specifically requires the same clearances for lead wires and unprotected conductors, whereas Rule 58.4-C does not specify clearances from lead wires but only from unprotected conductors. Such treatment recognizes the very practical situation created by the physical characteristics of the different types of equipment. Transformers, regulators, service restorers and a number of other equipments are cased in metal enclosures which readily permit the attachment of suitably protected conductors. Such conductors may have their sheaths "wiped in" so that the sheath and the case become electrically one. Assemblies of individual capacitors, by their very physical nature, do not lend themselves to such treatment. Manifestly it is completely impracticable to so construct a pole-top bank of individual capacitors. These practical differences as well as the relative hazards involved were carefully weighed at the time the general order was promulgated by this

Commission. The difference in treatment, evident from a careful reading of the respective rules, is deliberate.

In the general order, the basic clearances are set forth in Rule 37 and Rule 38. Where such basic clearances are not clearly applicable or require either supplementation or modification for specific applications or situations such rules are referenced to succeeding rules in the general order. Thus, it will be found, for example, that where particular treatment of lead wires is warranted or necessary specific rules, as in Rule 58.3-C3, cover the subject. The very absence of reference to lead wires in Rule 58.4-C should indicate that such rule neither modifies the basic clearances nor the treatment applicable to lead wires as referenced in the preceding Rule 58.4-B6. It follows, therefore, that applicant's interpretation of the requirements of the general order in this respect, as set forth on sheet 1 of Exhibit No. 4 in this proceeding, is in error as applied to the relatively simple situation there depicted.

In view of the evidence and the foregoing discussion of various of its elements we are of the opinion that applicant's proposal that the existing rules of General Order No. 95, applicable to the problems presented in this proceeding, be changed so as to permit cases of equipment to be grounded when such cases are at clearances from conductors and other objects less than as presently required by the order, has no merit and would create unnecessary and unreasonable hazards to linemen. We conclude that applicant's request should be denied.

The evidence indicates that comparatively few capacitor banks are automatically switched at the present time but it is applicant's intent that during the next two years the great bulk of its capacitor banks will be switched. In view of our conclusion

that applicant's request should be denied, applicant should look to early correction of the present equipment deficiencies to the end that the uniformity of construction and operation contemplated by General Order No. 95 will prevail, as respects the grounding or nongrounding of equipment cases, over its entire system. With respect to those installations now in service, under the temporary authorizations granted by this Commission's Resolutions E-873 and E-908, we are of the opinion and so find that it is reasonable to require that applicant place each of them in conformity with the provisions of General Order No. 95 by not later than December 31, 1957. In the interim, such installations may be continued in existence under the conditions set forth in said Resolution No. E-873. Applicant should keep records of these installations adequate to ensure without question that after December 31, 1957 no one of them will remain in nonconformance with the provisions of General Order No. 95.

FIFTH SUPPLEMENTAL ORDER

Based upon the evidence and the conclusions and findings set forth in the foregoing opinion,

IT IS HEREBY ORDERED that the application of Pacific Gas and Electric Company for permission to deviate from the provisions of General Order No. 95, as set forth in this fifth supplement to Application No. 25309, is denied.

IT IS FURTHER ORDERED that the time limit set forth in this Commission's Resolution No. E-908 is hereby extended to and including December 31, 1957.

The effective date of this order shall be twenty days after the date hereof.

Dated at San Francisco, California, this 21st day of February, 1956.

[Signature]
President
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Commissioners