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GENERAL ELECTRIC TYPE EJ-01 AND TYPE EF-1 FUSE PROBLEMS

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General Electric Type EJ-0-1 Sand-filled Glass PT Fuses

(This information is from a Bonneville Power Administration Substation Maintenance Information Sheet Dated June 30, 1971)

The purpose of this chapter is to alert personnel to a potential problem that may develop because of impact closing of the subject fuses.

A discrepancy in revenue metering led to the inspection of the associated fuse bank. One of the fuses was not making contact with the harp, and the resulting arc had eroded the silver from the fuse surface. The increased contact resistance in the fuse clip affected the accuracy of the revenue metering.

The harps on this type of fuse mount can be permanently sprung open by a forcible closing of the fuse with a hot stick in the manner normally used to close a hook-operated disconnect switch. The result of such closing will spread the harp to the point of poor or no contact with the possibility of the fuse dropping back open if the lower fuse contact is not tight enough to hold the fuse in the upright position.

The harp is a poor design utilizing a short leaf-type spring made of phosphor-bronze material to exert fuse-clip pressure on the cartridge-type fuse ferrule. This spring - as springs go - is relatively dead soft and takes a permanent set if bent too far. Because of the height of the mountings and the limber hot sticks, it may be difficult to close the fuses by pushing and may require a jab to close. The fuse clip will not stand anything but a gentle close as the hot stick inertia will bottom the fuse and spread the clip.

If trouble is experienced with this GE-type fuse mount, consideration should be given to replacing it with a more suitable fuse mount.

Failure Of General Electric Type Ef-1, 115-kV, A30E Ampere Fuse

A General Electric fuse Type EF-1, 115-kV, A30E failed in the early 1960's at a Reclamation substation. Lightning arced over in the station and two fuses were found blown. One fuse was in Phase A and the other was in Phase C. The fuses were replaced and the station energized. About a half hour later, the Phase B fuse began burning and arcing. This fuse was replaced and the station energized.

Inspection of the removed Phase B fuse disclosed that the ejecting spring in the bottom of the fuse which gives part of the ejecting force to the conducting rod was broken into three pieces. The spring showed considerable rusting and broke in two places at spots that were severely rusted. It is apparent that the rusting deterioration of the spring took place over a period of time. The fuse holder or tube was filled with a considerable amount of accumulated material that resembled sticky dirt or sand. This material did have some corrosive effect on the connecting rod that is supposed to eject when the fuse link fails due to high current. It is believed the main cause of the failure of the conducting rod to eject was the broken spring. The sticky material which accumulated in the holder or tube could have provided enough friction to prevent the conducting rod from falling out due to gravity; but, because of the light weight of the conducting rod, no definite conclusion can be made on this point.

The actual fuse link length in these fuses is approximately 4 inches. Separation on fuse failure is by ejection of the conducting rod. Failure of the conducting rod to eject results in a separation or open circuit distance of 4 inches. With reenergizing of the circuit a current path can easily be established over this short distance at 115-kV. A fuse conducting rod that fails to eject provides no protection whatsoever.

The fuse is fitted with a disc over the bottom of the tube that is supposed to keep out dirt and presumably moisture, yet be fragile enough to allow ejecting of the conducting rod when the fuse link melts. However, in service these discs generally do not stay in place. They drop off within a relatively short time in most cases.

It is recommended that fuses with similar operating mechanisms be thoroughly inspected on an annual basis with particular attention given to operability of fuse ejection features.