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Rejuvenation Instructions Power Cables Failure Sample Handling

Version 20080525

Failure Sample Handling

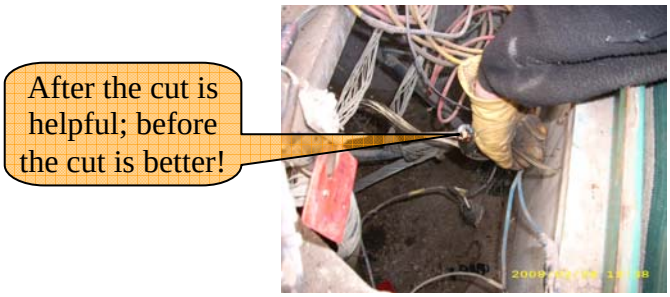
Novinium® brand Ultrinium™ technology provides at least twice the reliability of older injection approaches. Occasionally, even these treated cables or their attached components fail. Novinium learns from these failures and adjusts procedures, improves the equipment design, or reformulates the chemistry to provide a continuously improving post-injection reliability experience. These instructions help the circuit owner to provide the failure evidence in a way that preserves the failure story so that the most complete analysis can be performed. The principles of failure sample handling can be summarized into a handful of "do's" and "don'ts".

Do	Don't
•Photograph the failure site in its "as found" condition. •Remove all damaged cable and/or components, preferably as a single assembled unit •Use electrical tape to secure bare neutrals •Seal all ends and fault hole to minimize fluid loss •Collect a warranty tag •Send the sample to the Reliability Lab right away	•Throw anything away •Cut right at the failure •Clean anything •Bend or cut the sample to fit it in a package •Straighten a bent sample

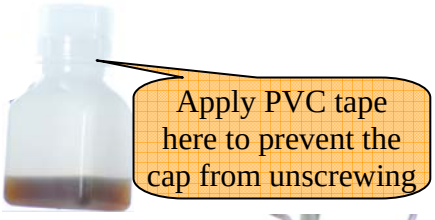
All cables must be deenergized, tested dead, and grounded before any of these Failure Sample Handling instructions may be executed. All switching operations must cease. 100% of the personnel on the site must verbally concur that it is safe to handle the cable. The ground must be connected to the termination to be handled, or in the case of a spiking operation at a cable midpoint (e.g. a splice or fault), the ground must be immediately adjacent (i.e. the connection can be confirmed by an unobstructed view of the cable between the spike and the work area) to the portion of the cable to be worked. The individual who executes these Failure Sample Handling instructions must be present when the ground is put in place.

Caution: Working around energized high-voltage systems may cause serious injury or death. The procedures in these instructions should be performed by personnel familiar with good safety practice in handling high-voltage electrical equipment. De-energize and ground all electrical systems before proceeding.

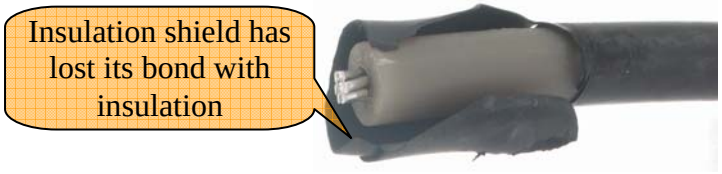
1. Take photographs of the fault location in an as-discovered condition to document the cable environment and cable lay. If the cable or component is bent significantly take a photograph at a right angle to the bend to document the bending radius.
2. Execute the instructions of NRI-99, "Cutting a Treated Cable" before proceeding with this NRI 93.



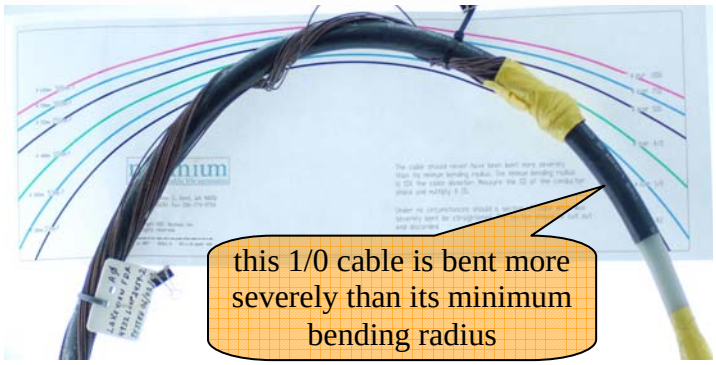
3. Preserve recovered fluid.
   a. Place any fluid-stained paper towels or rags in zip-to-close plastic bags.
   b. Pour any fluid into clean bottles which can be tightly sealed.
4. Apply PVC tape to bare neutrals to keep them in place.



5. Visually examine the cable near the fault site for any defects including a-c listed below.
   a. The insulation shield is separated from the insulation.
   b. The insulation shield has discharge marks, mechanical damage, or thermal damage.



   c. The cable is bent more severely than its minimum bending radius. The minimum bending radius is 15X the cable diameter. Measure the OD of the insulation shield and multiply by 15 or use the bending radius template, NRI 11.



6. Cut the entirety of the portion of the cable and, where appropriate, the cable components that includes all damage from the step 4 survey.

7. Seal all cable ends and the fault hole to minimize any fluid loss. Shrink-to-fit end caps are ideal for cable ends, but a plastic bag secured with PVC tape is okay. Plastic sheeting over the fault hole cinched at either end with PVC tape is the best way to seal the fault hole.
8. Without bending the sample, package it for shipment. All fluids should be in sealed bottles. Secure bottle lids with PVC tape. Place the bottles into zip-to-seal plastic bags. Use packaging filler to prevent damage during shipment. In the box include a warranty tag and a copy of the completed Novinium Warranty Claim Form available at www.novinium.org.
9. If any portions of a cable or component must be removed in the field …
   a. Apply marking tape to identify where the component ended.
   b. Remove the component with minimum damage to the underlying portions. Note any inadvertent damage.
   c. Photograph the failure site again after the component has been removed with the marking tape in the field of view.