5-4-90

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SUBJECT: 50mm SSC Cable Size and Cross Section Status

This note is an attempt to update and clarify the information concerning the discrepancy between the insulated and uninsulated cable sizes spelled out in a note on 4-19-90. That note showed that the cable sizes derived from the W6733 cross section generated by Gerry Morgan (shown on Fermi dwg. #0102-MD-292000) were not in agreement with the cable sizes published by the cable manufacturers (Ron Scanlon). This happened because the cross section was created before the cable size was firmly established. The discrepancies in the outer were insignificant, but the inner totaled about 3 mils on the cable width. Specifically, the inner bare cable width being given by the manufacturer was .480 while the bare cable width assumed by the cross section was approx. .477. This was enough to put our mold and mandrel lamination drawings on hold while we waited for clarification.

The problem was considered at the task force meeting of 5-3-90 attended by John Carson and Jim Strait. It turned out that the cable manufacturers were considering changing the inner cable width to .486 instead of the .480 which they had previously released. The decision was made to go with the .486 bare cable width on the inner cable while still using the same outer cable. This increases the inner cable width discrepacy to 9 mils (.486 minus .477). The discrepancy was resolved by decreasing the inside radius of the inner coil by 9 mils. All other features of the W6733 cross section remain the same. The four cured coil radii are therefore:

Outer coil outer radius = 1.9583 inches +.001/-.000 (same as on 292000)
Outer coil inner radius = 1.4847 inches +.000/-.001 (same as on 292000)
Inner coil outer radius = 1.4747 inches +.001/-.000 (same as on 292000)
Inner coil inner radius = .9753 inches +.000/-.001 (.009 less than on 292000)

These numbers can be used to determine the curing mold and mandrel sizes.

Concerning the cross section itself: All coordinate points for insulated cable corners stay the the same except the inner coordinates of the inner cable. These points will now be at the intersection of a circle of .9753 radius and the lines representing the sides of the present inner cables as shown in Figure 1. Cross section drawing #292000 should be changed to reflect this.

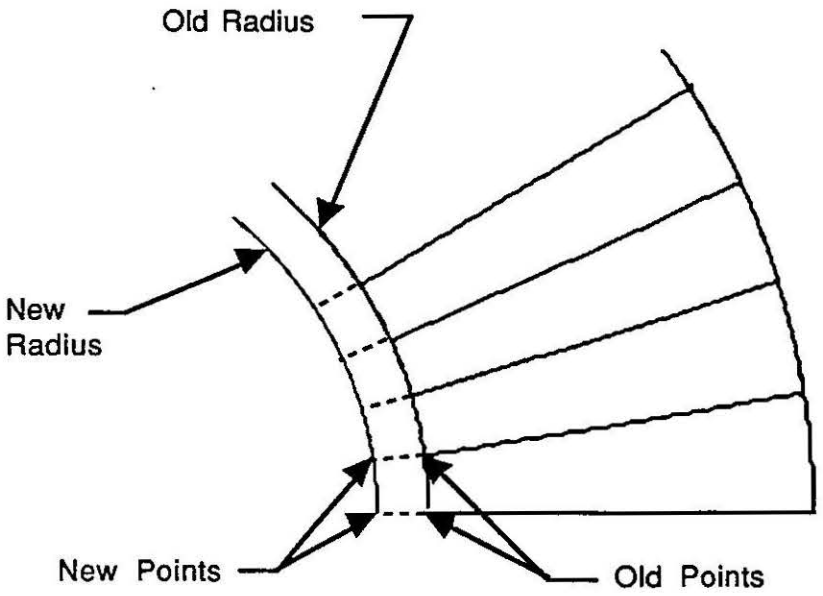

Figure 1

Changing the cross section in this way will allow the collar laminations, ground wrap, and outer coil end parts (already being produced at BNL and in advanced stages of design at FNAL) to remain the same.

The cable width, however, will be increased in a way which is not entirely consistent with the way the cross section is being changed. In the cross section the keystone angle and high end thickness are being held while the low end thickness is allowed to change as shown in Figure 2. On the cable the high end and low end thickness are being held while the keystone angle is allowed to change as shown in Figure 3. This will result in the condition seen in Figure 4, where the cable insulation must compress more at the thin edge than the thick edge. The extra compression is on the order of .0001 per side, so the present thinking is to disregard it.

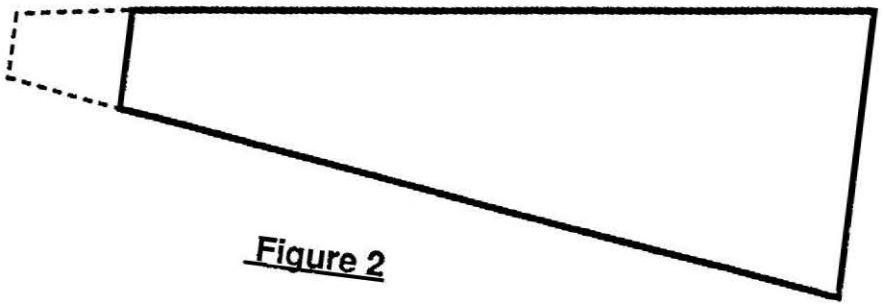

Figure 2

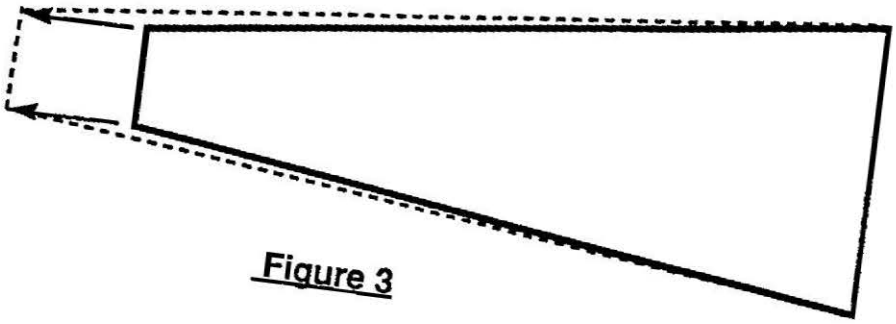

Figure 3

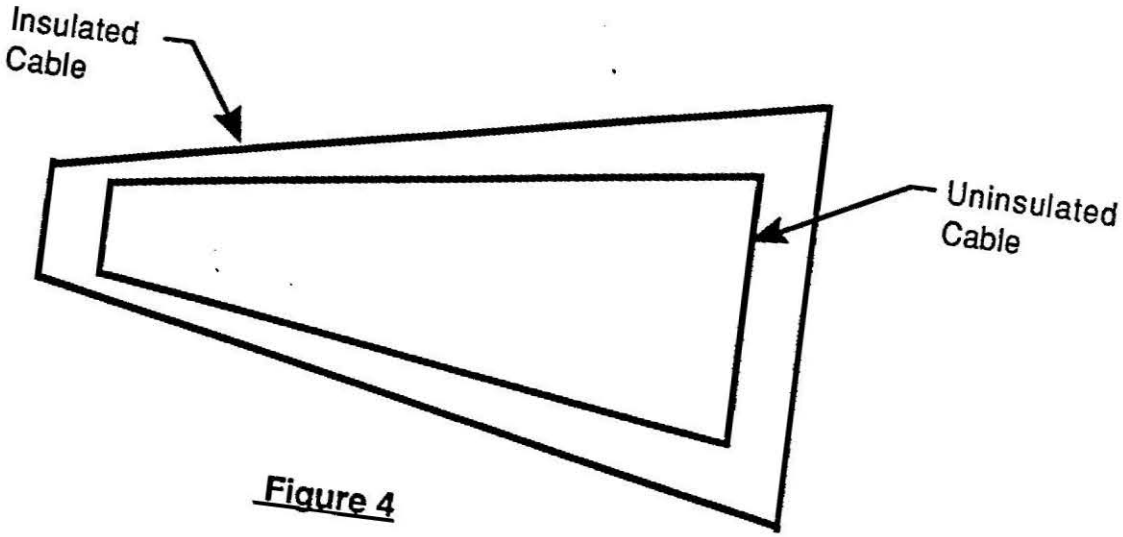

Figure 4

We can now order the winding and curing molds and mandrels. We should change our cross section, inner coil G-10 tubing, end part design and wedges to reflect this change.