Several sample joints were made by three individuals who will be performing or supervising the brazing of all joints. The joints were hydrostatically tested to 200 PSI, helium leak checked, pull tested to failure, and x-rayed. In addition Bates saw cut a few of the joints for inspection.

Per Everson, all joints passed hydrostatic testing and helium leak check. The pull test is summarized below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Tensile Strength</th>
<th>Failure Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 263-1</td>
<td>26,830 psi</td>
<td>Base</td>
</tr>
<tr>
<td>Sample 263-2</td>
<td>26,530 psi</td>
<td>Weld</td>
</tr>
<tr>
<td>Sample 543-1</td>
<td>26,780 psi</td>
<td>Base</td>
</tr>
<tr>
<td>Sample 543-2</td>
<td>21,940 psi</td>
<td>Weld</td>
</tr>
<tr>
<td>Sample (unknown)</td>
<td>28,000 psi</td>
<td>(unknown)</td>
</tr>
<tr>
<td>Virgin copper</td>
<td>31,510 psi</td>
<td>Base</td>
</tr>
</tbody>
</table>

The joint that failed at 21,940 psi was one of the first joints performed and was remade so that the weld was probably weakened. From these results Bates will accept the pull tests as passing.

The x-rays showed porosity and some voids but Everson didn’t give the testing company a specification so they reported on all signs. After inspecting the x-rays the porosity and voids do not compromise the strength or “tightness” of the joints so Bates will accept the x-ray test as passing.

Test joints were received from Everson and tested for resistivity, the specification called out 4.676 μΩ/ft. at 20°C. Results follow:

2 joints were tested with 92.9A and one piece of the copper was tested w/out a joint.
Virgin:                  421 µV                      = 4.53 µΩ
Sample 1 (263-3)        433 µV                      = 4.66 µΩ
Sample 2 (543)          434 µV                      = 4.67 µΩ

So, as is seen above the joints passed the resistivity check.

Bates received two joints that were then saw cut in two directions perpendicular to
the joint. We found a few voids but in general there was good flow of the braze
material. We did notice however on one joint that it appeared that the heat had been
applied for too long a period to the joint and the braze material had tended to flow with
gravity to the bottom of the joint leaving more voids at the top. However Bates will
accept the sawed joints as passing.

Jim Kelsey performed a site visit on Monday June 29th. The winding fixture was in
operational condition and the first coil was being started. I also observed the facing
and drilling process of the conductor. This was being referenced to the square part of
the conductor. What was found is that the location of the hole in the conductor is not
well identified and when a hole for the ferrule is drilled from the outside of the
conductor that hole and the hole through the copper are not concentric. This non-
concentricity is very noticeable in some joints. After discussion at Bates it was
determined that there is nothing that we can do about this condition and it does not
affect the flow or soundness of the joint so we will accept it. However we will closely
monitor the flow test after the coil is wound to ensure that it meets our specifications.

In summary, Everson should make every effort to control and “perfect” the brazing
operation so as to ensure the best flow of the braze material in the joint. Also
Everson will keep us up to date of progress and Bates will have another site visit
when the first coil is finished winding at which point we hope to do dimensional
checks and flow tests. After the first coil is finished Bates will also get an updated schedule from Everson. One concern was the amount of wastage in the proposed winding process. With the current plan Everson will come to within 1000 pounds of the total material received. Everson should closely monitor this and strive to minimize scrap. Everson has indicated that this will be reviewed again at the end of winding the first coil. Bates would like Everson to ship all scrap material to Bates at the completion of the project.