

**University of Portland**  
ME 421 – Failure Analysis  
Fall 2011

1. Complete Phases II (if not done already), III and IV for pump mounting leg welding failure. Do NOT do any destructive testing – I need these parts for future classes. Therefore, only limited testing can be performed, such as microscopic examination (also, there are several photographs attached with the first part of this assignment last week). There should be enough data available to you for you to develop a solid theory. However, if there are other tests that you would like to do, but cannot, describe it and explain what it may tell you. Explain how it would either confirm or reject any hypothesis. **Try to convince me, based on the evidence you have that your theory is correct. Carefully observe the failures – it tells a story. The explanation you develop must be supported by data, and it must explain all of the data.** As always, there may be more than one contributing cause of failure. You may want to resubmit Phase I and II work along with this if it helps your conclusion.
2. ANTS! If a German ant's mass is 1 gram, how much weight would a beam have to support if there were a billion ants standing on it? State all assumptions.
3. Read Chapters 13 (link on course web page). Write a brief concise paragraph for summering each of these (2 paragraphs total).
4. Read the Mars Climate Orbiter article (link on course web page) to gain some background as to the root cause of this accident. In about one-half page, explain similarities between the accidents of Space Shuttles Challenger and Columbia and Mars Climate Orbiter. Discuss general lessons learned (decision “root cause” not technical details).